



SMITHSONIAN LIBRARY









SMITHSONIAN INSTITUTION  
WAR BACKGROUND STUDIES  
NUMBER FIFTEEN

---

ICELAND AND GREENLAND.

*By*  
AUSTIN H. CLARK



(PUBLICATION 3735)

---

CITY OF WASHINGTON  
PUBLISHED BY THE SMITHSONIAN INSTITUTION  
AUGUST 19, 1943

The Lord Baltimore Press  
BALTIMORE, MD., U. S. A.

## CONTENTS

	Page
General introduction .....	1
Iceland .....	3
Preface .....	3
Description .....	3
Climate .....	6
Geology .....	7
Fauna .....	9
Flora .....	12
History .....	13
Language .....	31
Literature .....	32
Modern Iceland .....	40
Selected bibliography .....	43
Greenland .....	47
Preface .....	47
Description .....	47
Icebergs .....	52
Climate .....	53
Geology .....	54
Fauna .....	59
Significance to the natives of the animal life .....	71
Flora .....	76
The native inhabitants of Greenland .....	77
History .....	82
Modern Greenland .....	89
Language .....	93
Literature .....	96
American interest in Greenland .....	98
Selected bibliography .....	100

## ILLUSTRATIONS

### PLATES

	Page
1. Leifr Eiríksson .....	1
2. Upper, Reykjavík, Iceland .....	4
Lower, Þingvellir, Iceland .....	4
3. Left, Iceland waterfall .....	4
Right, Iceland geyser .....	4
4. Left, Basaltic rock formation, Iceland .....	4
Right, Volcanic rock formation, Iceland .....	4
5. Upper, Kerlingarfjöll, central Iceland .....	4
Lower, Snorri Sturluson's bath .....	4

	Page
6. Upper, Crater of Mount Hekla.....	20
Lower, Near the summit of Öræfajökull.....	20
7. Upper, Svartifoss .....	20
Lower, View from Þorsmörk, interior Iceland.....	20
8. Upper, A salmon river in northern Iceland.....	20
Lower, Lake Hvitávatn; face of a glacier.....	20
9. Upper, Nesting grounds of the eider duck, Iceland.....	20
Lower, Bláfell, where the whooper swan nests.....	20
10. Upper, Eskifjörður, eastern Iceland.....	36
Lower, Stream banks, showing typical columnar structure of lava.....	36
11. Left, Icelandic girl in national costume.....	36
Right, Icelandic sailor.....	36
12. Left, Haðfoss (High Falls).....	36
Right, Iceland gyrfalcon.....	36
13. Upper, Vestmannaeyjar, southern Iceland.....	36
Lower, Ísafjörður, northwest peninsula of Iceland.....	36
14. Upper, Akureyri in spring.....	52
Lower, Siglufjörður, Iceland.....	52
15. Upper, Foss (Waterfall) Farm, southeastern Iceland.....	52
Lower, A modern farm at Eyjarfjörður.....	52
16. Upper, Seyðisfjörður, eastern Iceland.....	52
Lower, Fáskrúðsfjörður, east coast fishing village.....	52
17. Upper, Native Greenland boats.....	52
Lower, Iceberg off the west coast of Greenland.....	52
18. Left, Peary monument at Cape York, Greenland.....	68
Right, Ruins of old church at Kakortok Harbor, Greenland.....	68
19. Upper, Holsteinborg, Greenland.....	68
Lower, Julianehaab, Greenland.....	68
20. Upper, Ívigtût, Greenland.....	68
Lower, Angmagssalik, Greenland.....	68
21. Upper, Greenland girls dressed in native costume.....	68
Lower, Herd of walrus on the ice off the coast of Greenland.....	68

## TEXT FIGURES

	Page
1. Map of Iceland.....	4
2. Map of Greenland.....	48







# ICELAND AND GREENLAND

By AUSTIN H. CLARK

*U. S. National Museum*

(WITH 21 PLATES)

## GENERAL INTRODUCTION

With the modern development of the submarine, the airplane, and the radio, Iceland and Greenland have become of great importance to all military operations in the North Atlantic area. These two regions, near together and very similar in some ways, in other ways are very different.

Iceland, Europe's westernmost outpost, was uninhabited when first discovered. It was peopled by immigration chiefly from Norway, and soon developed into a unified nation which has to a large extent retained its original characteristics, but little changed by what has happened in the rest of the world. The population is supported by pastoral activities and by fishing. From Iceland the countries of Europe, and from them our own country, derived the parliamentary system of government, and from the extensive and varied early literature of Iceland we learn much of what we know of the history of Europe in the early days and of ancient Scandinavian mythology, and all that we know of the early colonization of Greenland and of the attempted colonization of Vinland (North America). For the rest of the world, therefore, interest in Iceland centers mainly about its history and its early literature.

Greenland, the easternmost outpost of America, at the time of its successful colonization was inhabited by Eskimo. It is a trade colony with a sparse population of Europeans and about 40 times as many natives. The population is almost wholly dependent for its existence upon the products of the sea, mainly seals and the smaller whales, to a much less extent on fish and sea birds. As a Danish colony it has been closed to foreign trade and other influences. Every possible effort has been made to develop the region for the benefit of the native peoples, to create among them a national democratic feeling, to develop a national literature

---

### PLATE 1

Leifr Eiríksson, son of Eiríkr Thorvaldsson (the Red), an Icelander resident in Greenland, the discoverer of North America. The statue, located in Boston, is by Anne Whitney.

and culture, and to guard them from harmful foreign contacts. The chief interest in Greenland, therefore, centers about the native inhabitants (Greenlanders) and their efforts, under Danish guidance, to form a Greenlandic nation; the natural resources of the surrounding seas upon which the life of the people depend, and their conservation; and the possibility of developing new resources on land. It may be noted that at the present time the product of the cryolite mine at Ivigtût, which is the largest in the world, is of great importance to us in the war effort. The native Greenlanders are of much interest to us, for in the early days of Danish colonization they did not differ in any great degree from the Eskimo in Alaska.

## ICELAND

### PREFACE

When a traveler in Iceland returns home and becomes reminiscent, it is difficult for him to avoid the language of exaggeration. If he has sailed all around the island and has, besides, wandered up and down its interior, he has seen a new world, has observed a surprising number of new objects, and has lived through a new life. If it be not all beautiful, it is all fascinating—although sometimes with the fascination of awe. For there is no country traveled of man which combines as Iceland does the antagonistic marvels of frost and steam, of ice and fire, of gloom and color, of darkness and light. It is, on the whole, unequaled in all Europe for its gushing fountains of seething water, for its stupendous streams of lava, for its vast volume of milk-white torrents plunging over grim and swarthy rocks, for the varied, weird, and fantastic forms of its mountains and lowlands and often of its climbing slopes, for the luminous tints of its peaks, for the splendors of its heavens, and for the gray, overawing desolation poured out by its volcanoes. To this effect wrote Prof. Willard Fiske.

Sir Richard Burton sums up the general effect of Iceland upon a visitor essentially as follows: It is strange how her beauties grow upon him. Doubtless the scenery depends far more upon color and complexion than in the genial lands of the lower latitudes. But during the delightfully mild and pleasant weather of July and August, seen through a medium of matchless purity, there is much to admire in the rich meads and leas stretching to meet the light blue waves; in the fretted and angular outlines of the caverned hills, the abodes of giant and dwarf; in the towering walls of huge horizontal steps which define the fjords; and in the immense vistas of silvery cupolas, "cravatted" cones and snow-capped mulls, which blend and melt with ravishing reflections of ethereal pink, blue, azure, and lilac, into the gray and neutral tints of the horizon. And often there is the most picturesque of contrasts; summer basking below, and winter raging above; peace brooding upon the vale, and elemental war doing fierce battle upon the eternal snows and ice of the upper world.

### DESCRIPTION

Iceland lies in the North Atlantic between latitude  $63^{\circ}24'$  and  $66^{\circ}32'$  N., just south of the Arctic Circle, which touches the most northerly









## PLATE 2

Upper: Reykjavík, Iceland; a view of the center of the city, on the site of the first settlement by Ingólfr Arnarson in the year 874.

Lower: Þingvellir, the plain about 30 miles from Reykjavík, where the first Althing or Parliament was held in the year 930.

(From Ísland í myndum. Photographs by Halldór Arnórsson.)





PLATE 3

Left: One of Iceland's many waterfalls, where a stream plunges over the escarpment bordering the plateau.

Right: One of Iceland's geysers in eruption. There are many geysers and hot springs on the island.

Courtesy Canadian Geographical Journal.

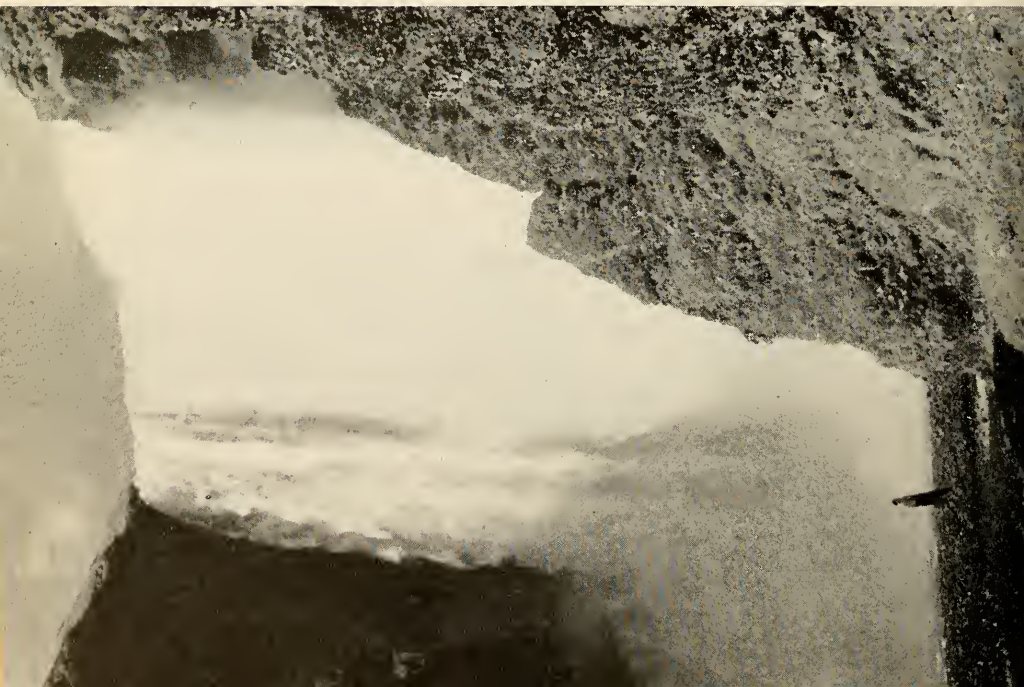




PLATE 4

Left: Columnar or organ-pipe structure is common in the basaltic rocks of Iceland. The cooling of the molten rock formed the cracks which separate the lava into blocks, often roughly five-sided.

Right: A peculiar mushroomlike rock caused by erosion in the lavas and material ejected from the volcanoes.

Courtesy Canadian  
Geographical Journal

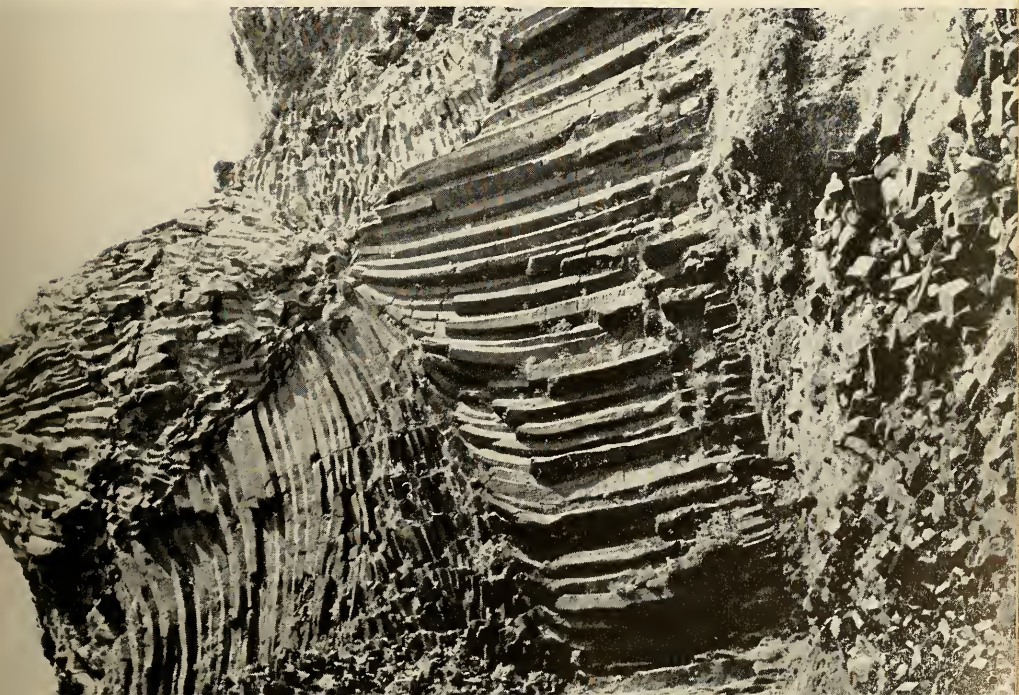






PLATE 5

Upper: Kerlingarfjöll, central Iceland, showing the desolate character of the interior. Photograph by Björn Arnórsson.

Lower: Snorri Sturluson's bath, the only remaining structure dating from Iceland's earliest settlement. Photograph by Vigfús Sigurgeirsson.

(From Ísland í myndum.)



extension of its eastern portion and passes just north of Cape Horn in the extreme northwest. Its northwestern tip is 180 miles east of southeastern Greenland. It is 298 miles in greatest length and 194 in greatest width, with an area of 39,709 square miles—about the same as that of Virginia and slightly less than that of Cuba. Most of its surface is barren rock, in many places covered with glaciers or local ice caps, or volcanic or glacial detritus, the productive area being only 5,673 square miles, or about the same as the area of Connecticut—and by no means so productive.

In shape Iceland is roughly oval, the longer axis nearly east and west, with a large and very rugged peninsula jutting out to the northwest, which is joined to the mainland by an isthmus  $4\frac{1}{2}$  miles wide and 748 feet high. The island is essentially a rugged plateau of volcanic rock pierced on all sides by fjords and valleys. Although the lowlands scarcely exceed 7 percent of the entire area, they are almost the only part that is inhabited. The axis of highest elevation runs from the great snowfield of Vatnajökull, 3,300 square miles in extent, in the southeast to the northwest. The crest of this axis, from which the numerous rivers flow outward to the sea, is marked by a chain of snow-capped mountains or mesas separated by broad patches of lower ground. These mountains or mesas are from 4,500 to 6,400 feet in height, and rise from 2,000 to 3,000 feet above the general surface of the inland plateau. The highest of them is Öräfajökull.

There are very many lakes in Iceland of which the largest are Thingvallavatn and Thorisvatn, each with an area of about 27 square miles. Mývatn in the north is famous for the natural and unique beauty of its surroundings.

Some of the numerous rivers carry great volumes of water. Most of the larger ones have their origin under the glaciers. Where the rivers fall from the high interior into the lower coastal region there are many waterfalls, some of which are among the largest and most magnificent in the world. The most remarkable are Dettifoss in the north and Gullfoss in the south. The total amount of available water power is estimated at 4,000,000 horsepower, of which only about 25,000 has as yet been utilized.

The northwestern peninsula has a mean elevation of 2,000 feet. Its surface is bare and desolate, covered with gravel and fragments of rock, with here and there large straggling snowfields on the higher areas. Here the only inhabited districts are the shores of the fjords where there is sufficient grass for sheep raising, though in this region most of the people support themselves by fishing.



The largest low-lying plain, lying between Mýrdalsjökull and Reykjanes, has an area of about 1,550 square miles. In its lowest parts this plain is only slightly above sea level, but it rises gradually toward the interior, terminating in a ramification of valleys. Its maximum altitude is 381 feet, near Geysir. West of Mount Hekla this plain connects by a regular slope directly with the tableland, from which clouds of pumice dust and drift sand are sometimes blown down. It is drained by three large rivers, Markarfljót, Thjórsá, and Oelfusá, and numerous smaller streams. Toward the west there are many hot springs. There is another lowland plain nearly 400 square miles in extent around the head of Faxaflói, the eastern part of which is called Borgarfjörður and the western Mýrar. Generally speaking, the surface of this plain is very boggy. From this lowland several narrow valleys penetrate the central tableland.

The two great bays on the west, Faxaflói and Breiðafjörður, as well as the many bays on the north, which are separated one from another by rocky promontories, appear to owe their origin to subsidence, whereas the fjords of the northwestern peninsula and those of the east coast seem to be the result chiefly of erosion.

Most parts of the island are studded with hills ranging in height from 2,000 to 3,000 feet, with the tops usually bare and rocky, the sides with a sparse growth of grass and heather.

#### CLIMATE

Entirely surrounded by the sea, Iceland has a relatively mild maritime climate which is not nearly so severe as might be expected from its northerly situation. Most of the coastal area is influenced by the northward drift of the warm water of the Gulf Stream, but a cold current from the north, which frequently brings with it a quantity of drift ice, washes the northern and eastern sections, so that conditions vary greatly in different parts of the island.

At Reykjavík the mean annual temperature is 39°—the same as that of Quebec; the mean temperature for January is about 30°—the same as that of Boston, Indianapolis, Boise, or Salt Lake City; and the mean summer temperature is 52°—the equivalent of the mean temperature for January in Mobile, or for April in Cincinnati or Washington. In the north, at Akureyri, it is colder, the mean annual temperature being 32°, that for the winter 20°, and that for the summer 45°. On the uninhabited high interior plateau the climate is severe, and it is often extremely cold. But the temperatures are very variable. The mean annual temperature may differ as much as 10° in different years, while the mean temperature for the same month has been known to differ as much as 27°.

The weather is rather uncertain. Gales and snowstorms are frequent in winter, and thunderstorms, which are very unusual, occur mostly in winter. But at Reykjavík it seldom snows, and in the lowlands snow rarely remains on the ground for very long. In the southern and eastern sections the weather is generally changeable, stormy, and moist. Here the precipitation is high, 49.4 inches, or the same as that at Vicksburg, and greater than that over most of the United States. In the north it is much drier, the precipitation on the island of Grímsey being 14.6 inches—about the same as at Denver or Santa Fe. There is frequently mist or fog, but when the weather is clear, as it often is, the atmosphere is almost unbelievably transparent, so that mountains may be seen distinctly from a distance of 100 miles—a fact that has been remarked by almost all visitors to the island.

### GEOLOGY

Iceland is composed almost wholly of volcanic rocks none of which are older than the Middle Tertiary, and some of which are of very recent origin. Two-thirds of the island is composed of basalt, and one-third of pelagonic breccias.

In certain places as inclusions in the basalt there occur deposits of clay with the remains of Tertiary plants, tree trunks pressed flat, and lignite. In some areas well-marked impressions of leaves have been found. These deposits are especially thick in the northwestern peninsula. They show that in the Tertiary Iceland possessed extensive forests, and that the mean annual temperature must have been at least  $48^{\circ}$ —about that of Detroit.

The pelagonic breccias, most extensively developed in the south and on the tableland, are composed of reddish, brown, or yellowish rocks, tuffs, and breccias, and belong to several different groups, the youngest of which seem to be later than the Pleistocene or Ice Age.

In the north near Húsavík there occur marine deposits containing marine shells belonging to the Red Clay division of the Pliocene.

Except for a few small isolated peaks rising as nunataqs above its outer margin, a vast sheet of ice, which on the tableland had a thickness of from 2,300 to 2,600 feet, covered the whole of Iceland during the Pleistocene.

Since the Pleistocene the island has risen, and signs of this elevation are common, especially on the northwestern peninsula. These signs consist of well-developed marine terraces of gravel, shore lines, and beaches. In several places there are traces of marine shells, and skeletal remains

of whales and walrus, as well as ancient driftwood, have been discovered at some distance from the present coast.

These ancient shore lines are at two different heights. The highest, from 230 to 260 feet above the present sea level, contain shells which are characteristic of high Arctic regions and are no longer found in Iceland. The lower, from 100 to 130 feet above the sea, contain shells belonging to species now occurring along the coasts.

An area of 5,170 square miles, or a little more than 13 percent of the total surface of Iceland, is covered with snowfields and glaciers as a result of the raw, moist climate, large precipitation, and low summer temperatures. The snow line varies greatly in different parts of the island, rising from 1,300 feet in the extreme northwest to 4,250 feet on the northern side of Vatnajökull in the southeast. The largest snowfields are Vatnajökull (3,300 square miles), Hofsjökull (520 square miles), Langjökull (500 square miles), and Eyjafjallajökull and Mýrdalsjökull (390 square miles). The glaciers that stream outward from these snowfields are often very long. The largest glacier from Vatnajökull has an area of between 150 and 200 square miles, but most of the glaciers are much smaller. Altogether there are more than 120 glaciers known in Iceland.

Most of the mountains (107) are, or have been, volcanoes, and at least 25 of them have been active within historic times, occasionally doing great damage, especially when several of them erupted together. The most famous of these volcanoes, though by no means the most important, is Hekla in the southwest, which as a source of myths and superstitions ranks with Etna and Vesuvius. There have been more than 100 eruptions since the island was inhabited. Some of the volcanoes have been active at several different times, while others have erupted only once. The intervals between the eruptions have been most irregular. At periods of special activity several volcanoes have erupted simultaneously, as in 1340 when Öræfajökull, Hekla, Mosfell, Herðubreið, and Trölladyngja were all in action, and in 1510 when Hekla, Herðubreið, and Trölladyngja burst out. From 1724 to 1730 was the period of greatest activity, 12 eruptions having taken place during those 6 years. In the western part of the great icefield of Vatnajökull eruptions occur under the ice, breaking their way upward through hundreds of feet of solid ice. Besides these volcanic outbursts on land, there have been volcanic activities under the sea in the vicinity of Iceland, especially off the peninsula of Reykjanes.

Closely connected with the volcanic activity are the sulfur springs or solfataras, of which the most important are those of the Krisuvík on the Reykjanes Peninsula south of Reykjavík, and those in the neighbor-

hood of Lake Mývatn in the northern province. Other sulfur springs are found near Húsavík.

Everywhere in Iceland there are very numerous hot springs and steam vents, some of them even in the rivers, under the glaciers and ice caps, and on the sea bottom. Certain of these hot springs from time to time send up a column of water to a considerable height. The most famous of these spouting hot springs is Geysir (the Gusher), about 80 miles east of Reykjavík. From an orifice more than 9 feet in diameter Geysir intermittently sends up a column of water to a height of from 160 to 180 feet. It is from this famous spouting hot spring that the similar springs in our Yellowstone National Park and in New Zealand get the name of geyser.

#### FAUNA

*General features.*—The present land fauna of Iceland consists of immigrants which have reached the island since the Pleistocene or Ice Age when it was completely covered by an ice cap except for a few small and barren peaks. All the included animal types are either inhabitants of all far northern regions, or of European affinities. There are no reptiles or amphibians.

The sea fauna is exceedingly rich and diversified. In the north and east it is Arctic, but in the south various boreal European types occur which here reach their western limit. The fauna of the deep sea south of Iceland is that of the Atlantic deeps, while that of the colder depths to the north is that of the Norwegian Sea.

*Mammals.*—The only indigenous land mammals in Iceland are the Arctic fox and a local variety of the long-tailed European field mouse. The fox causes considerable trouble by killing sheep. It is not known to feed upon the mouse. Polar bears from time to time come to Iceland from Greenland on the drift ice, but in no great numbers. From 10 to 14 may be killed in the course of a winter.

Reindeer were introduced in 1770. They multiplied to some extent, but they were never domesticated, since the role they play in the economy of the Lapps in Norway was already taken by the horse and the cow in Iceland.<sup>1</sup> They live in the unpopulated districts, especially on the rolling mountain deserts in the northeast, where they are hunted in the winter for their flesh and horns.

The sea mammals are the same as those of Greenland, but the high

---

<sup>1</sup> Prof. Stefán Einarsson, of Johns Hopkins University, *in litt.*



Arctic types are much less common or, like the walrus, only casual visitors.

The domestic mammals are cattle, sheep, the famous small and tough Iceland ponies, and dogs, chiefly of the Eskimo type.

*Birds.*—Somewhat more than 100 different kinds of birds are known from Iceland. Disregarding those that are to be found in all Arctic regions, the birds of Iceland are essentially those of northern Europe, and additional European species are regular or casual visitors, as for instance the house martin, swallow, European blackbird, hooded crow, and lapwing.

The most important bird is the eider duck which, rigidly protected by law, is almost a domestic fowl. It is abundant on the coasts and on some of the lakes, breeding on islets, either natural or artificial, and taking readily to prepared nesting sites. It has even been known to nest on the roofs and in the windows of farmhouses. Eider down has long been an important item in the export trade, and the eggs are eaten.

Of great importance in the past was the Iceland gyrfalcon, a large and powerful bird occurring in both a gray and a predominantly white phase. The gyrfalcon is a common bird in Iceland, rather less common in Greenland. In all the nations of Europe this bird, especially in the white phase, was the most prized of all the falcons in the old days when falconry was the great sport of Europe, and brought extravagant prices. In the days of the Crusades the princes of the Church were, by special dispensation of one of the Popes, permitted to have their falcons with them during service, and to allow them to perch on the altar. It is recorded that some time before 1396 the Saracens captured a son of the Duke of Burgundy and demanded 12 white falcons as ransom. These birds could have been obtained only in Iceland or Greenland. With the waning of falconry, interest in these birds died out, though for a long while their skins and eggs found a ready sale to museums and to private collectors.

A fairly common bird in Iceland is the white-tailed eagle which in habits and in appearance, except for its brown head, resembles our bald eagle. The small falcon known as the merlin is common everywhere. Numerous in many places in the interior is the whooping swan, a European swan that formerly was found also in Greenland. This bird used to be killed in large numbers for the sake of its quills. The Iceland ptarmigan, closely related to the "grouse" of Scotland and to the ptarmigan of the European mountains, is rather common everywhere where berries grow. Ravens are abundant.

Perhaps the commonest of the small land birds in Iceland is the snow



bunting; wheatears and meadow pipits are also common, and white wagtails are frequently seen.

The commonest and most generally distributed of Icelandic birds is the golden plover. Along the shores flocks of wheeling turnstones, ring plovers, dunlins, and other less common sandpipers attract the attention of even the most casual observer. Over the sea small parties of gannets may be seen circling, one after another plunging heavily into the water and emerging with its prey, while cormorants and shags cluster on the seaweed-covered rocks. Alfred Newton wrote that

Near the mainland, the Great Black-backed Gull soars in dignified majesty around the intruder, expressing his anger in notes of the deepest bass, until the alarm being spread abroad, a cloud of Kittiwakes, obedient to the summons, hurry from the neighboring shallows and awaken the echoes with their petulant exclamations; which are redoubled, should a skua, that viking among birds, make his appearance. Still and ghost-like in the distance, buoyant Fulmars wing their way, wheeling round with scarce a beat of their wide pinions. The insulated stack or precipitous cliff affords a footing, a nesting place, to countless Razorbills and Guillemots.

Iceland's most interesting bird is, or used to be, the garefowl or great auk, which, extinct since 1844, formerly was common about certain islets off southwestern Iceland. This was the only flightless bird of the North Atlantic.

*Fishes.*—The fishes of Iceland are essentially the same as those of Greenland, with the addition of a number of boreal types in the southwest and west. The cod fisheries of Iceland are among the most important in the world. Other important fisheries are based upon the herring, halibut, and plaice. The great basking shark is sometimes hunted for oil. Many of the rivers abound in salmon, and trout are plentiful in the lakes and streams.

*Insects.*—The insects of Iceland are either wide-ranging types found more or less throughout the northern portions of the world, or insects of northern Europe. There are 700 different kinds known from Iceland. As in all northern regions, two-winged flies predominate, being represented by 241 species. Among them is a black fly or buffalo gnat that occurs all over the island and is locally abundant, and often is an extremely annoying pest to man and animals, just as it and its relatives are with us. But mosquitoes, though they occur, are local and not abundant. The next largest group is the Hymenoptera—bees and their allies—including 148 species, most of which are parasites, mainly on flies. There is only a single bee, a handsome bumblebee that makes its nests in the abandoned nests of field mice. There are 144 different kinds of beetles.

There are no butterflies indigenous to Iceland, although in Greenland they live even in the extreme north, on the border of the permanently frozen Polar Sea. Five, possibly six, different kinds of butterflies have been captured in Iceland. Four of these, the painted lady (the most frequently captured), the red admiral, the small tortoiseshell, and the cabbage white, the last taken on a ship in Reykjavík harbor, are presumably strays from Europe, although the two first might come from North America. One, the American painted lady, is from America. The largest and handsomest of the Arctic butterflies (*Colias hecla*) was originally described from Iceland, but whether it was a stray from Greenland, where it is common, or was mislabeled, is uncertain. It has not been found in Iceland since. Although there are no butterflies, there are 47 kinds of moths, some of which are very pretty. A few of these are pests, like the grasmaðkurinn (*Cerapteryx graminis*) the caterpillars of which are cutworms, living on the roots of grasses.

*Marine invertebrates.*—The marine invertebrates of the shores of Iceland, especially in the north and east, are those of the Arctic seas; in the west and south some of the more characteristic Arctic types are lacking, their absence being compensated by the occurrence of a number of boreal European forms. The deep water south of Iceland harbors the fauna of the North Atlantic deeps, that to the north the fauna of the colder deeps of the Norwegian Sea, the dividing line between the two being the submarine ridge upon which Iceland is situated.

#### FLORA

The vegetation of Iceland is of an Arctic European type, and is fairly uniform throughout the island, even including the interior tablelands. About 440 kinds of flowering plants and vascular cryptogams are known. Birch woods are found in many places, especially in the warmer valleys, but the trees are low, from 3 to 10 feet in height, in a few localities reaching from 13 to 20 feet. A few rowan or mountain-ash trees occur singly here and there, some of them reaching 30 feet in height. There are nearly a score of different kinds of willows, most of them dwarfs, though some in places reach a height of from 7 to 10 feet.

There are many attractive, though small, flowers, among them buttercups, marsh marigolds (the "cowslips" of New England farms), poppies, violets, pinks, vetches, meadowsweet, the ubiquitous white dryas, saxifrages, dandelions and other composites, heaths, gentians, bluebells, forget-me-nots, and primroses. Many of our common weeds occur in Iceland, most of them probably introduced in early days. Among these are yarrow

or milfoil, tansy, orange hawkweed, dandelion, St. Johnswort, and viper's bugloss.

The grasses are of the greatest importance for the inhabitants, for upon them they are dependent for the keeping of their livestock. Heather covers large areas, and is also important as pasturage for sheep. The seaweed on the beaches is likewise of great value as food for sheep.

One of the more important plants of Iceland is the so-called Iceland moss, in reality a lichen which, erect or ascending and growing to a height of 3 or 4 inches, looks more or less like a moss. It is especially characteristic of lava slopes and plains of western and northern Iceland, but it also grows abundantly in the mountainous regions of all northern countries. In the past it was extensively used as food, and was also exported. It has a pleasant, though somewhat bitter, taste.

### HISTORY

Haraldr Hárfagri succeeded his father Hálfðan Svarti (the Black) as a petty king in Norway about the year 863. The refusal of Gyda, daughter of Eiríkr of Hadaland, to marry him until he had made himself ruler of all Norway, as Eiríkr had of Sweden and Gormr had of Denmark, is said to have awakened his ambition to become king, and he vowed that he would never clip or comb his hair until he had fully accomplished his aim. After he had finally subdued most of the other petty kings he sent for Gyda and made her one of his wives, and at a feast in Möre he had his hair cut by the King Rögnvaldr, who gave him the name of Hárfagri—the Fairhaired.

Some of the kings, rather than submit to the domination of Haraldr, had left their homeland, and with their retainers settled in Iceland, the Faroes, the Orkneys, the Shetlands, and even in the Hebrides. And thus it happened that at about the time when Edmund the Saint, King of East Anglia, was killed by the Dane Ívar, son of Ragnar Lodbrók—in the year 874—Ingólfr Arnarson, who had visited the island a few years before, came to Iceland with 400 followers to seek a new home. On arriving off Iceland, Ingólfr threw his high seat pillars (that stood in front of the high seat in the hall) into the sea and vowed that he would settle at the spot where they floated ashore. The gods were good to him, for after a long and diligent search his messengers found them on the beach in an ideal spot at the head of a bay near some steaming craters. Here he settled, calling the place Reykjavík—Smoky Bay.

Iceland had been known for some time before the coming of Ingólfr. It was said to have been accidentally discovered by Naddothr, a Norwegian



viking or pirate, while on a voyage to the Faroe Islands in 860. By a casual survey from the top of a hill on the east coast Naddothr satisfied himself that the land was too dreary to be inviting, and he called it Snjá-Land. Four years later a Swede, called Garthar, circumnavigated the island and gave it the appellation of Gartharsholm. Flóki, another adventurer, explored the north and west of the island, intending to settle there; but his cattle died from lack of food during the first winter, and he left. He it was who gave it the name of Iceland.

But the Irish had known of its existence long before this. Indeed, they had been the first settlers. Ari Thorgilsson wrote that when Ingólfr reached Iceland some Christian men whom the Norwegians called "popes" were already there, but later went away because they did not wish to live together with pagans. They left behind them Irish books, bells, and croziers, which showed that they were Culdees, or religious recluses. This is strongly corroborated by the ex parte statement of an Irish monk, Dilcuil, who wrote about the year 825. He said that he had spoken with priests who had visited the remote island of Thule, that it lay far away in the north, and that between it and Britain there was a cluster of islets (evidently the Faroes), some separated only by narrow straits. He added that these islets were thronged with countless sheep and sea birds, and that they had been inhabited for upward of a hundred years by Irish hermits, who had finally been driven away by Norwegian sea rovers.

Ingólfr was followed by other chieftains from Norway with their dependents, who settled more or less nearby in the southwest. A little later came Norwegians and others from the Hebrides, including Queen Audr, widow of Óláfr the White, King of Dublin, she and many of the others being Christians; they settled in the west, northwest, and north. Then, after about the year 900, more nobles came, chiefly from Norway, completing the settlement of the south, southeast, and northeast.

Björn Thórdarson says that according to the *Landnámabók*, or book of the settlements, the majority of the settlers came from Norway, but among them were a number of Swedes or men of Swedish descent. It is also estimated that from 12 to 16 percent came from "west of the sea," that is, from the British Isles and Ireland, though most of these were also of Scandinavian origin. He writes, it must be noted, that the Scandinavian leaders were very much interested in and proud of their lineage, and so there is little mention of Scottish or Irish families unless they could be traced to kings or nobles. It is probable that many of those who came from "the west" had taken wives there, and that the greater part of their company was of the same stock.

After the first settlement the island was occasionally visited by Irish and Scotch, more rarely by English, who sometimes remained, and Gaelic and Erse, captured by the vikings, were brought as thralls (serfs) to the new country. Thus from the earliest days there was a considerable infusion of Irish blood in Iceland, which accounts for the occurrence of such names as Njáll, Kormákr, and Kjartan, and such place names as Patreksfjord, Papey, and Papýli.

Immigration into Iceland, stimulated by the desire to be free of the arrogant and arbitrary overlordship of the rulers of northwestern Europe, was so extensive that early in the tenth century, according to the *Íslendingabók*, or Book of Icelanders, all available land had been occupied and the population approached the maximum the island could support under the then existing conditions. The original settlement of Iceland was especially interesting in that it was accomplished not by a group or groups of individuals seeking to better themselves in new surroundings, but by noblemen who came individually and independently with their retainers, wishing to escape subservience to others of greater power.

These noblemen or chieftains, about 400 in number, continued independently to exercise their judicial and other prerogatives over their retainers, and also performed the functions of *goði* or high priests, though freemen might claim their rights in the moot or public assembly (thing). But before long some of the more prominent men, each in his own district, established assemblies with legislative and judicial powers, and sometimes several of these combined to form a common assembly. Thus, as pointed out by Mr. Thórdarson, the first decades after the settlement passed without the existence of any central authority.

With the increase in population—at the beginning of the tenth century there were said to be about 25,000 people divided into about 30 clans—rivalries leading to feuds and other forms of lawlessness increased, and some sort of centralized control became necessary. Besides, it became necessary to guard against aggression from outside, for King Haraldr threatened to extend his authority over Iceland.

A member of a distinguished family named Úlfjót assumed the task of framing a general code of laws. He went to Norway and perhaps to other countries, and after 3 years' absence came back in 927 with his projected code. After 3 years' further consideration, in 930, the first general assembly or Althing was held on the extensive plain of Thingvellir, about 30 miles from Reykjavík, and Úlfjót's code was adopted. By this act the Icelandic republic was founded, and the island became a free and independent state.

The unified state was composed of 36 (afterward 39) local divisions or *goðorð*, each represented by a leading man of the district with the title of *goði*.

This code, or constitution, was of a feudal or aristocratic nature, and by it the Althing, a kind of House of Lords, was invested to a large extent with judicial as well as with legislative powers. The executive power was in the hands of the individual chieftains, or *goðar*, who also dealt with local administration without any higher authority exercising control. The chief feature of the constitution was the rule of the *goðar*; but all free-born men had the same rights, and serfdom soon disappeared.

It was agreed that such a meeting was to be held each summer for general legislation, adjustment of litigation, and settlement of disputes, the last by a jury system, the first to be established. The Althing met every summer in Thingvellir until it was dissolved in 1798. The Althing was not wholly successful in controlling the people, so 30 years later the country was divided into four quarters, each subdivided into thing districts, with a special court for each district.

Under this new constitution which, though essentially aristocratic and feudal, was drawn up with much political wisdom, the people of Iceland lived in peace for many years. Christianity, which originally had been the religion of the Celtic minority and, with certain modifications, of a few Norwegians, but had all but vanished, was adopted as the State religion by the Althing in the year 1000, without any change in the constitution. At first it did not make much difference in the life of the people; the pagan temples were converted into churches, and some of the young men became priests. Literary and other cultural activities were not interrupted as they were over most of continental Europe. Latin never gained a foothold here as the first language, and here the Roman law never dominated.

It was during this period that the discovery and settlement of Greenland occurred, which had for a byproduct the discovery and attempted settlement of Vinland, the mainland of North America.

Gunnbjörn, son of Ulf Kráka, when on a voyage from Norway to Iceland presumably about the year 900, was driven westward by a fierce storm past Iceland, where he saw a great country and found certain small islands or skerries which were called after him the Gunnbjörn Skerries. The country must have been Greenland, and the skerries, according to Capt. Daniel Bruun, were probably in the vicinity of Angmagssalik. In the second quarter of the tenth century some men from the southwestern regions of Iceland undertook a voyage of exploration to the Gunnbjörn Skerries. Among them were two brothers, Snæbjörn and



Hrólfr, whose father's sister had married a nephew of Gunnbjörn. They are said to have found the skerries, but the expedition ended unfavorably, and no results were obtained.

The most important personage in connection with the discovery and early settlement of Greenland was Eiríkr the Red. Fierce and warlike, but a great explorer and with superior ability, he was a born leader of men. He was born in Norway, at Jæderen, the son of Thorvald Ásvaldsson, who was forced to leave his homeland because of a murder, and came to Iceland, bringing Eiríkr with him. Here in later years Eiríkr quarreled with his neighbors and killed several of them, for which in about the year 980 he was outlawed for 3 years.

Eiríkr fitted out a ship to seek the land that Gunnbjörn had seen. He reached the east Greenland coast and sailed south, rounded Cape Farewell, and spent the first winter in Eiríksey, near the middle of the eastern settlement. Next spring he went to Eiríksfjörður (Tunugdliarfik) due north of Julianehaab, and gave names to many places. The second winter he was at Eiríksholms, by Hvarfsgnipa (according to Captain Bruun probably Nunarssuit), and the third summer he went north to Snæfell and into Hrafnfjörður. He then turned back and spent the third winter in Eiríksey, opposite the entrance to Eiríksfjörður, returning to Iceland the following summer. According to Ari Thorgilsson (Fróði—the learned) in the *Íslendingabók* he called the country Greenland because men would be more willing to go there if it had a good name.

After his return Eiríkr set himself to work recruiting settlers for the new land, with much success. A year later, in 985, no less than 25 ships are said to have sailed from the regions around Breiðafjörður and Borgarfjörður, of which 14 reached their destination, the others being lost at sea, or driven back to Iceland. Dr. Finnur Jónsson says that if we suppose there were from 20 to 25 persons in each vessel—and this seems the highest number likely, seeing that the ships also carried cattle, sheep, and horses, as well as household utensils—the number of the original Greenland settlers totaled 300 or a little more.

These new arrivals settled along the many fjords on the west coast of Greenland from about latitude 60° N., longitude 44°30' W. to about latitude 62° N., longitude 46° W.—the so-called Eystribygd or Eastern Settlement. This corresponds to the present Julianehaab District. It was said to have had finally 190 homesteads; ruins of homesteads have been found in 150 places. During the last 12 years of the tenth century the Vestribygd or Western Settlement was also populated. This settlement was farther north, around the present Ameralik and Godthaab Fjords, between about latitude 64° and 65° N., for the most part in the present



Godthaab District. This settlement was less thickly populated than the Eastern, having 90 farms and 4 churches. There is no information as to how the distribution of the land in this settlement took place, though the distribution of the homesteads in the Eastern Settlement is detailed in the *Landnámabók*. The greater part of the long stretch between these two settlements was never inhabited, and there were no permanent settlements on the east coast.

After the land was fully occupied the total population could not have exceeded 2,000. The settlers, largely from Iceland, though many of the later ones had come from Norway, had considerable livestock, mostly sheep and goats, and in some places small horned cattle and small horses. Hoofed animals, oxen and goats, and especially seals, furnished the chief means of subsistence. Undoubtedly fish were extensively eaten, but few fish bones are found in the refuse heaps of that time; it is supposed that fish offal, including bones, was used for fodder for the cattle in winter, as is still the practice in other regions in the far north.

The Norwegian King Óláfr Tryggvason in the year 1000 thought it worth while to make an effort to Christianize Greenland, sending a priest there with Eiríkr's son Leifr.

It was in the year 1000 that Leifr Eiríksson, son of Eiríkr the Red, on his voyage from Norway to Greenland, was driven westward by gales and discovered a new country which he did not explore. After his return to Greenland his brother Thorsteinn of Lýsufjörður in the Vestribygd undertook a voyage to the new country. He was caught in severe storms in the sea south of Greenland and Iceland and badly tossed about, finally returning to Greenland where he shortly after died of illness.

Soon after this a trader, Thorfinn Karlsefni, of distinguished Icelandic parentage, came to Greenland where he wintered in the house of Eiríkr the Red and married Guðrið, the widow of Thorsteinn. He heard the account of the new country and, deciding to explore it, set out from Greenland with a large following. He discovered Helluland (identified as Labrador), Markland (identified as Newfoundland), and Vínland. Vínland has been variously identified. Dr. Finnur Jónsson and others believe that G. Storm is probably correct in regarding it as Nova Scotia and Cape Breton. In the winter of 1003-1004 Thorfinn's son Snorri was born in Vínland, the first child of European (Icelandic) parentage to be born in North America. After various adventures, including intercourse with the natives ("Skrælings"), according to Dr. Jónsson in all probability Eskimo rather than Indians, who at first were friendly, but later turned hostile, Thorfinn returned to Greenland in 1006, bringing

with him two captured native boys. In 1007 he left with his wife and son for Iceland, where he subsequently resided.

Our knowledge regarding this attempted settlement of North America is fragmentary and vague. There must have been more extensive exploration of the region, by this or perhaps by other expeditions, than appears from the written records, for a typical Viking grave with eleventh-century weapons has been found near Lake Nepigon, Ontario.

The settlers in Greenland who accompanied Eiríkr the Red were chiefs with their households and thralls, but many free-born men followed in subsequent years. There were also dissatisfied chiefs from Norway who came to escape persecution by King Haraldr. As in all frontier regions, there were some who had sought refuge in this remote place because they had been adjudged outlaws in their homeland.

Capt. Daniel Bruun writes that the colonists in Greenland soon agreed to regulate their association in the same way as in Iceland. To judge from this, Greenland's constitution was the same as that of Iceland, contemplating an aristocratic republic. In the main the laws of Iceland were accepted, and once a year the people gathered in court at Gardar, the present Igaliko, which is on the tongue of land between Eiríksfjörður and Einarsfjörður. Here the judicial proceedings took place according to ancient Icelandic-Norwegian fashion. First was the assembly of law-makers, consisting of chiefs and their assessors, second the tribunal, and lastly the "lawspeaker" who pronounced and interpreted the laws. Eiríkr the Red had no particular command over the other Greenland well-to-do farmers, but they willingly subordinated themselves to his capacity, intellect, and administrative ability, so that it can be said that he was the highest chief in the republic, of which he was probably the "lawspeaker."

Captain Bruun says that at first the Greenland church, as well as the Scandinavian, was under the archbishop at Bremen, until 1103 when the archbishopric was established at Lund. Later, in 1152, the Greenland and Iceland dioceses came under the archbishopric of Trondhjem. In 1110 Greenland became an independent bishopric. There is a fairly complete record of the bishops of Greenland down to the end of the fourteenth century. Later, up to about 1530, a number of bishops of Greenland are mentioned who were never on the island.

After the establishment of the Althing there is little mention of internal affairs of Greenland. But the large number of outlaws mentioned and records of convictions indicate the same kind of reckless pioneer life as that of Iceland during the tenth century. During the eleventh, twelfth,

and part of the thirteenth centuries the country seems to have been more or less flourishing. From the early days there was a certain amount of more or less irregular trade, at first almost entirely with Iceland, later extending to Norway and Denmark and even England. Permanent trading posts were established early in the twelfth century.

In 1257 three Norwegians came to Greenland with the object of bringing the republic under the sovereignty of the King of Norway. Because of internal difficulties the Greenlanders were persuaded to submit to the rule of King Hákon Hákonarson in 1261—the year before the same action was taken by the parent republic of Iceland. The Greenlanders were now obliged to pay taxes and also to promise to pay fines for manslaughter, whether Norwegians or Greenlanders were killed. The Greenlanders accepted the Icelandic laws, and from the year 1281 the written Icelandic code or *Jónsbók* was said to have been in force in Greenland. But, like Iceland, Greenland still retained its *Althing*, and was probably divided into jurisdictions.

The Greenland trade in 1294 was declared a royal monopoly, on the same basis as the trade with Finmark. A trading vessel was supposed to visit Greenland every year, but the ship was frequently lost, and for several years together no ship would reach Greenland. This would mean that none of the necessities of life not procurable in Greenland, particularly grain, could be obtained. This trade monopoly was strictly enforced in the fourteenth century, and even as late as 1425.

The early settlers in Greenland had found the country uninhabited, though they noted traces of abandoned dwellings in several places.

Further evidence of the existence of natives was found in 1265 or 1266 when some pieces of timber were found out at sea which had been hewn with small axes; among them was a piece in which were tooth and bone wedges. After this discovery the priests sent a ship northward to investigate conditions north of the remotest parts yet visited. They found some signs that the *Skrælings* had lived there, but could not land because of bears. They also found traces of *Skrælings* on some islands south of *Snæfell*.

Early in the fourteenth century the *Skrælings* appeared in the northern portion of the region occupied by the colony, and soon after in the Western Settlement (*Vestribygd*). An expedition to this region about 1350 found no human beings, only some wild cattle and sheep which they used as food. Dr. Jónsson says it seems clear from this that the Western Settlement had been desolated for some time, having probably succumbed about 1325. This view, he notes, agrees with a passage in



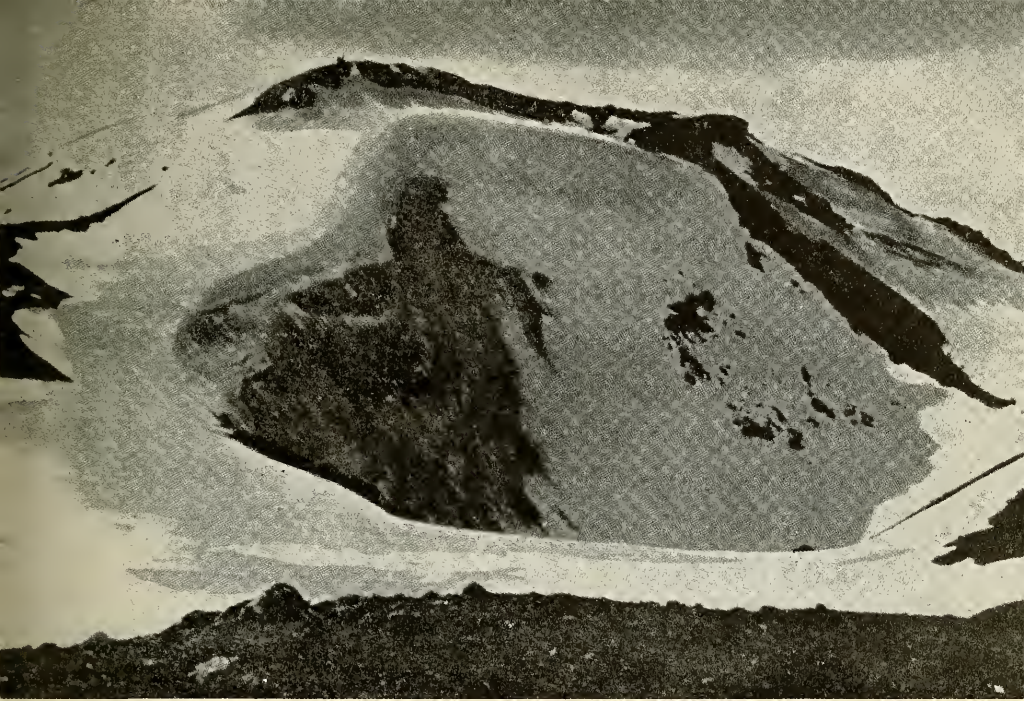


PLATE 6

Upper: One of the craters of Mount Hekla, Iceland's most famous volcano. Photograph by Páll Jónsson.

Lower: Near the summit of Öræfajökull, the highest mountain in Iceland. Photograph by Þorsteinn Jósefsson.

(From Ísland í myndum.)







PLATE 7

Upper: Svartifoss, a waterfall over basaltic cliffs. Photograph by Björn Arnórsson.

Lower: View from Þorsmörk, showing interior Iceland valleys. Photograph by Ólafur Magnússon.

(From Ísland í myndum.)







PLATE 8

Upper: A salmon river in northern Iceland. Photograph by Edvard Sigurgeirsson.

Lower: Lake Hvitávatn; face of a glacier. Photograph by Björn Arnórsson.

(From Ísland í myndum.)





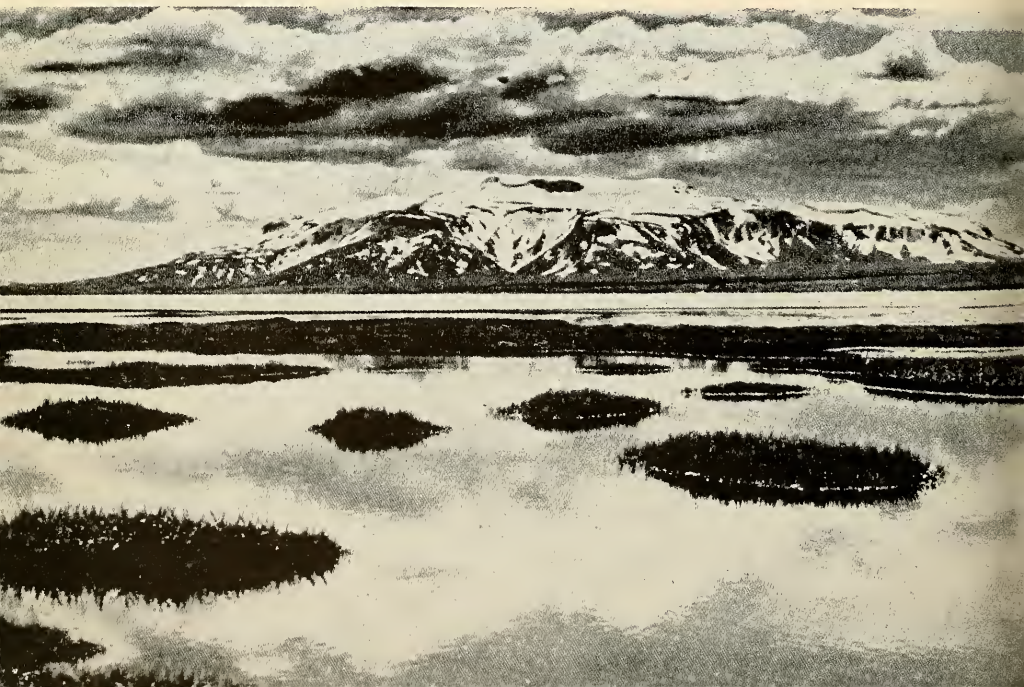


PLATE 9

Upper: Nesting grounds of the eider duck, Iceland's most important bird, the source of eider down. Photograph by Vigfús Sigurgeirsson.

Lower: Bláfell, where the whooper swan nests. Photograph by Páll Jónsson.

(From Ísland í myndum.)



the account of this expedition: "Now the Skrælings have the whole Western Settlement; there are horses, goats, cattle, and sheep, but everything is wild, and no people. . . ."

But there was not always trouble between the Eskimo and the Greenlanders. In one of the native legends recorded by Dr. H. J. Rink it is related that in the beginning, when the Eskimo first came to the Western Settlement, they and the Norsemen lived peacefully together. But later disagreements arose, and the Norsemen attacked the tent place of the Eskimo in the neighborhood of Uyaragssuit. The men were away on a reindeer hunt, and the Norsemen attacked the women and killed all but one of them. This inspired the Eskimo to take revenge. Another light is shed on the disappearance of the Greenlanders by a passage written for the year 1342: "Greenland's inhabitants left of their own accord the true belief and the Christian religion, and laid aside all good customs and true virtues and turned to the American people [i.e., the Eskimo heathenism]." This would indicate that some, at least, of the Norsemen became merged with the natives.

In 1355 a ship was sent out from Norway, which had not sent a ship to Greenland for 9 years (the time of the "black death"), so as to hinder "that Christianity should decline." This expedition was under the command of Paul Knutson and returned to Bergen in 1364. No account of the expedition was ever written, but a stone with an inscription in Runic symbols dated 1362 found near Kensington in western Minnesota, and several iron weapons of a type dating from the late Middle Ages from the same general region, suggest that this expedition may have penetrated to the far interior of North America, perhaps by striking southwestward from Greenland.

There is a record in the year 1379 to the effect that "The Skrælings made hostile onslaughts on the Greenlanders, killing 18 men, but caught two boys, whom they made thralls." This must refer to the Eastern Settlement (Eystribygd). It is possible, as maintained by Dr. W. Thalbitzer, that these Eskimo came from the south, around Cape Farewell. But most of the Eskimo that invaded the Eastern Settlement came from the north.

In 1389 a complaint was made to Queen Margaret that some Icelanders had visited Greenland and there carried on illicit trade. Dr. Jónsson relates that the Icelanders swore that they had been at the Althing in Greenland, where the common people had agreed that no east-men present should be allowed to buy food unless they also bought merchandise intended for export. The Icelanders did not dare to do this, though



they offered to carry commodities belonging to the Crown; but as they had no papers to this effect no goods were entrusted to them, which caused them to be set at liberty. Dr. Jónsson says that this throws a clear, but unfortunately also a very lurid, light on the unhappy position of the Greenlanders.

Because of the competition of the Hanse merchants, and to some extent because of the plague that raged in Norway in 1392 and the destruction by fire of Bergen in 1393, the Norwegian merchants were no longer able to carry on the sailings to Greenland. The last record contained in any of the annals of events dealing with Greenland is dated about 1407, and in 1410 the last ship returned to Europe from that country.

According to a somewhat dubious report, German merchants in Bergen in 1484 killed about 40 sailors because they refused to sell them the products which they might bring back from Greenland.

A papal letter dated 1492 says

It is said that Greenland is an island lying at the end of the world, that the inhabitants there have no bread, wine, nor oil, but live on dried fish and milk. On account of the surrounding ice navigation to the island is seldom, and landing can only take place in August, after the melting of the ice; therefore one believes that no ship, in the last eighty years, has been there, nor a bishop or priest has lived there. And the consequence has been that most of the inhabitants have fallen away from the Christian belief and have no other memorandum of it than that once a year an altar-cloth is shown which had been used by the last bishop about a hundred years before. Now, on the appeal of the then Cardinal Borgias, the Benedictine monk Mathias had offered to go as missionary to that country so as to convert the apostates, and had wished to risk both life and health on this enterprise by personally traveling there by ship.

There are no further references to the Icelandic colony in Greenland, which was abandoned and all but forgotten, perhaps partly because of internal difficulties in Iceland and the increasing contacts between Iceland and the countries of northern Europe.

The 60-year period of colonization of Iceland, followed by the first hundred years of the republic, constituted the picturesque Saga Age. There had been the stirring events of the colonization itself, then the discovery and colonization of Greenland, followed by the discovery, exploration, and attempted colonization of the North American mainland. Also, there were voyages through the Baltic and to Russia, foraging raids along the coasts of Spain and into the Mediterranean, the service of Icelanders as court poets and bodyguards at various European courts, and journeys through every known land and sea of the time, the travelers usually coming home to spend their later years in reminiscence.



After 1030 came what the Icelanders regard as the two centuries of peace, when commerce replaced piracy. Stefánsson notes that the most fashionable journeys now were pilgrimages to the Holy Land, although there continued to be much travel to other countries. During this period the sagas assumed the varied forms they now have in the vellum manuscripts, as sober family histories and national histories of Iceland and of various European countries, chiefly those of the northwest; as more or less romanticized accounts of the adventures of the leaders of the Saga Age; and as highly fictionized and decorated sagas of the Burnt Njáll type, which, according to Stefánsson, are historical novels rather than histories. At the same time there was also the recording of the ancient poetry and mythology which the settlers had brought with them, mostly from the Scandinavian countries, some of it strongly colored by other influences, chiefly Irish.

This era of peace was followed by a time of turmoil. All the *goðorð* had gradually come into the possession of a few families, who abused their power for their own ends. The natural result was sanguinary struggles between these families, leading to general chaos and misery. The King of Norway, Hákon Hákonarson, strongly supported by the foreign ecclesiastical power, which desired to increase its hold on the national Icelandic church, watched for an opportunity to take part in the internal dissensions of the Icelanders, and finally, in 1262, the Icelandic people were induced to swear allegiance to him. The submission of the country, quarter by quarter, was completed in 1264, and the original republic came to an end.

With the lawbook which was formally accepted in 1271 and revised in 1281 a complete change was made in the constitution. The supreme power was in the hands of the king. The *goðorð* were abolished, and royal officials took the place of the *goðar*. The Althing was retained in a modified form, chiefly as a court of law with judges who were chosen by the royal officials; it also had some legislative power, exercised partly in conjunction with the king and partly by itself. The power of the Crown was increased by the confiscation of the great Sturlung estates, which were sublet to farmers, while the early falling off of the Norwegian trade threatened to deprive the country of its means of existence.

Under the republic life had been turbulent and lawless, though free and varied. The republic produced men of mark, and fostered bravery, adventure, and progress. The great chiefs were in reality only greater franklins (freemen), but their wealth and comparative luxury gave them leisure and opportunities for culture that raised them as examples and leaders above their fellows, while pride of birth preserved a nobility

of feeling and high standard of honor amid much of violence and chicanery. But now increased burdens and decreased opportunities gradually reduced the upper classes almost to the level of peasant proprietors, with little political interest in the present and little hope for the future. But their pride in their past and in their families was maintained.

The fourteenth century saw a succession of terrible calamities in Iceland. Many volcanic eruptions occurred, spreading ashes over wide areas and destroying meadows and pastures so that the stock died of hunger, followed by the people, and even damaging the fishing grounds. In the year 1340 Öraefajökull, Hekla, Mosfell, Herðubreið, and Trölladyngja all erupted simultaneously. In addition to this, deadly epidemics carried off much of the stock and many people. In 1349 the "black death" killed about one-third of the people in Norway, and Norwegian interest in Iceland all but disappeared. The same disease raged throughout Iceland in 1402-1404.

From the old days of the republic there had been an intermittent and desultory trade with England, more or less on a buccaneering basis. This trade now increased to appreciable proportions. About 1312 Kingston-upon-Hull began to flourish, and Leland says that the great increase in this town

was by passing for fish into Iceland from whence they had the whole trade of stockfish [unsalted dried codfish] into England, in such time as all the trade of stockfish for England came from Iceland to Kingston. Because the burthen of stockfish was light, the ships were ballasted with great coble stones brought from Iceland, the which in continuance paved the town of Kingston throughout.

In 1381 Norway entered into a union with Denmark, in accordance with which the laws of Iceland, revised and little altered by King Hákon, were continued by the new masters. By the union or compact of Kalmar, Sweden was allied under a common king with Denmark and Norway in 1397, and the old Treaty of Union by which Iceland had reserved her essential rights was more or less overlooked by the Danish monarchs. New taxes were imposed. But it was neglect arising from the remoteness of the island and its relative unimportance from the continental viewpoint rather than any positive action that damaged Iceland's interests.

The half-smuggling, half-buccaneering trade that had long been carried on with England, especially through the enterprise of the Bristol merchants, with the Germans, and to some extent with other peoples, now became of much importance, and without it Iceland would have fared badly. The Icelanders exported stockfish, sulfur, wool, and eider down, and received in exchange, as before, wood, iron, honey, wine, grain, and flax goods. This period of Iceland's history is rather colorless.

She had peace, but not prosperity. There was not much the people could do. Even shepherding and such agriculture as there was declined.

Because of complaints made by the King of Denmark concerning the bad conduct of the English in the Iceland fishery, King Henry V ordered proclamation to be made "that none of our subjects do for one year to come presume to resort to the coasts of the isles belonging to Denmark and Norway, more especially to the Island of Iceland, for fishing or any other reason to the prejudice of the King of Denmark." As a result of this, for the next 10 years many of the English who frequented Iceland were pirates as well as fishermen. A minute account of the enormities they committed is preserved, from which it appears that these vessels were fitted out from Hull, Lynn, and other eastern ports. This condition probably originated in the exactions of the Danes under the pretense of toll.

About 1425 the English fishery trade with Iceland reached its greatest volume. Ships from Bristol and other western ports entered the trade in competition with those from the eastern ports. As a result of this increase in shipping, there soon was not enough available fish to load all the boats. In order, it was said, to conciliate the King's uncle, the King of Denmark, an act was passed by King Henry VI in 1430 forbidding Englishmen to enter the dominions of Denmark, excepting only the town of Northberne (Bergen) in Norway, and by no means to enter into any other of the territories of Denmark in opposition to the King of Denmark's prohibition. This statute seems to have made no difference in the resorting of Englishmen to Iceland, which was then on the increase; probably licenses were granted to the English fishermen by the King of Denmark. That the English continued to fish in Iceland appears from the quarrel between the Kings of Denmark and England over the killing of the governor of Iceland by some Englishmen from whom he had extorted extravagant tolls in 1469. On this occasion the King of Denmark seized four English ships with their cargoes in the Baltic.

It is interesting to recall that in 1476 Christopher Columbus visited Iceland, meeting Icelandic sea captains who informed him that Icelandic vessels had found land on the western side of the North Atlantic. This knowledge may have contributed to the maturing of his plans for his famous voyage of 1492.

In Iceland, as elsewhere, the Reformation wakened men's minds, opening new vistas of hope and new fields of thought; but it left their circumstances but little changed or, if changed at all, it was for the worse. The royal power was now greatly increased. The Hanse trade now replaced the English, to the detriment of the people, and the Danish



monopoly which succeeded it when the Danish kings began to act with vigor under the stimulus of European changes was still less profitable.

In spite of the resented arrogance of some of the Roman Catholic bishops, the Reformation was not at first welcomed by the Icelanders. In 1537 King Christian III had given his sanction to a new code which embraced the Lutheran creed. This was sent to Iceland, but no attention was paid to it. Stern measures were then applied. In 1541 the King appointed Christopher Huitfeldt governor and sent him to Iceland with two warships. The mission of the governor was to bring about the adoption of the new church code, to prevail upon the people to take the oath of allegiance to King Christian III, and to grant him a new tax. The Althing of 1541 assembled under the drawn swords of the foreign military forces. Bloodshed and uprisings followed. But the reformation was not established until 1550 when Jón Arason, the last Roman Catholic bishop, and his sons were beheaded at Skálholt.

Church properties were confiscated and their revenues diverted to the royal purse. The glebes and hospital lands were a fresh power in the hands of the Crown, and the subservient Lutheran clergy became the most powerful class in the island, while the bad system of underleasing at rack rent and short lease with unsecured tenant rights was extended in this way over a great part—at least a quarter—of the better land, stopping all possible progress. The details of the religious changes are uninteresting. Nearly all who took an active part on either side were men of low type, moved by personal motives rather than by religious zeal, and the story of the acceptance of the Reformation is not altogether a pleasant one. Stefánsson writes that when it was once accomplished, the little group of able men who came to the front for two or three generations, stirred by the new life that had been breathed into the age, did nobly in preserving the records of the past for a later time to evaluate and appreciate. Among the notable men of this time were Oddur Gottskálksson, translator of the New Testament, Guðbrandur Thorláksson, bishop, publisher of the Bible, and Hallgrímmur Pétursson, a writer of hymns.

The close of the sixteenth century and the beginning of the seventeenth was marked by a new curse, that of the English, Gascon, and Turkish pirates, who caused widespread panic and more or less devastation in 1579, 1613-1616, and 1627.

The Turkish raid in the summer of 1627 was described by Jón Ólafsson, the "Traveler to India," an Icelander from a poor and obscure, though typically self-respecting, family. This emphasizes an interesting point. Dame Bertha Phillpots points out that though it is true that the decay

of education amidst the disasters and famines of the first half of the seventeenth century is a common theme of lament among contemporary Icelandic authors, "there was still a great deal of truth in the statement made by a Norwegian divine some thirty years before Jón's education began that 'among the Icelanders it is a usual custom that they teach their children, of both sexes, to read and write.'" So even under the most adverse circumstances the poorer people in Iceland were better educated than some of the nobility in continental Europe.

The eighteenth century was the gloomiest in Iceland's history. Smallpox, famine, sheep disease, and the terrible eruptions of 1765 and 1783 followed each other in awful succession. Against these calamities, which reduced the population by about one-fourth, little could be done, and, as remarked by Stefánsson, when the only man who might have roused the Icelanders from their misery, distress, and impoverishment, the noble and patriotic Eggert Ólafsson, a hero of the old type, was drowned in the midst of his career in 1768, it is hardly to be wondered that things went from bad to worse, and that a listlessness and torpidity crept over the national character. The few literary men, whose work was done and whose books were published abroad, were concerned only with the past, and Jón Vídalín was the one man of mark, besides Eggert Ólafsson, who worked and wrote for his own generation.

In the early years of the century the trade of Iceland, which had been monopolized by the Danes since the beginning of the seventeenth century, though until long afterward they were not able to exclude the English from it, was found to be a losing one. The Danish ships, nominally at least king's ships, were armed. Some went to the fish ports, and some to the flesh ports. Everything was purchased by barter at fixed prices that never varied.

When Sir Joseph Banks visited Iceland in 1772 he found the monopoly of the trade there much in the same condition as had been described in 1733 by Bushing. But now the barter prices were by no means fixed. The company that traded in the king's name through their agents altered them every year in proportion to the success of the fishery in such a way as to secure the whole produce of the island, no matter whether great or small, at the same price to themselves—that was for just enough European necessities to keep the Icelanders from starving. Thus all initiative and energy were suppressed. The greatest industry by the Icelanders resulted in no more advantage to them than ordinary exertions. The people complained bitterly of this, and repeatedly solicited Sir Joseph to propose to his government the purchase of the sovereignty of the island from Denmark, which they thought would be sold for about

£100,000. They believed that they would very soon make good this sum to their new masters.

In 1783 there occurred the most devastating volcanic eruption in the history of the island, that of Skaptá. The Danes sent relief ships with all the supplies they could spare for the stricken people, and it was proposed that the inhabitants be removed and resettled in Jutland.

It was during the eighteenth century that all the colonial and outlying peoples subject to the European powers had the most difficult time. Colonies were regarded as areas for exploitation for the benefit of the homeland, and if they produced nothing of value they were neglected. Denmark was a European country surrounded by powerful neighbors of uncertain and constantly changing sentiments toward her. Her main preoccupations were with Europe. To her Iceland was a remote and impoverished region, reached only by a long and dangerous voyage and producing little that could not be procured elsewhere more conveniently and with less risk. The attitude of Denmark toward Iceland was in principle parallel to the attitude of England toward the American colonies at the same time.

The most oppressive features of the Danish trade monopoly were removed in 1788, though the monopoly was not finally abolished until 1854.

The first census of Iceland was taken in 1703. This was very thorough, giving the name, standing, and age of every person. It was one of the first to be taken in any country. At that time the inhabitants numbered 50,000; but by 1801 the number had fallen to 47,000.

During the summer of 1808 a British letter of marque (or privateer), the *Salamine*, arrived in Iceland, looted the public treasury of about 35,000 rixdaler, and took some private property. The public money was later returned by the British Government because the captain had exceeded the privilege of his letters of marque, which entitled him to prey on the enemy's ships, but not to commit depredations on land.

In 1809 a respected British merchant, Samuel Phelps, misled by a keen and unscrupulous attorney's clerk, J. Savignac, and an equally unscrupulous Danish adventurer, a prisoner of war on parole, Jörgen Jørgensen, went to Iceland in the letter of marque *Margaret and Anne*, captured the governor, Count Trampe, annulled all Danish authority, confiscated Danish property, committed all sorts of depredations, and set up a new and independent government under Jørgensen. In the middle of August the British man-of-war *Talbot*, Capt. the Hon. Alexander Jones, arrived. Captain Jones demolished the fort which had been set up, and restored the government to the state in which it had been before



the "Revolution." Count Trampe, who had been taken to England, was returned and liberated. Jørgensen was sent to prison as an enemy alien who had broken his parole by leaving the country. He eventually was sent as a convict to Tasmania, where he died in 1844.

At this time Denmark was allied with Napoleon, though the sentiment of the people as a whole favored England. Although Iceland had nothing to do with the war which made Denmark an enemy of England, she was technically an enemy country from the English point of view, and as such exposed to depredations by English marauders. Since the British Government hesitated to follow Sir Joseph Banks's advice to annex Iceland, it occurred to him that the only remedy for the situation was for Iceland to be declared neutral so long as the war lasted. He finally succeeded in bringing this about, and an order in council was issued to this effect on February 7, 1810, including the Faroes and the Greenland settlements as well as Iceland. In order to improve the situation, a British consul, John Parker, was appointed for Iceland in 1810.

It was at this time that trade between Iceland and the United States first began. In 1809 the *Neptune and Providence*, Capt. Samuel Staples, brought a cargo of foodstuffs, brandy, and tobacco. In 1810 Edward Cruft of Boston sent another ship, and in 1811 still another, this one with wares better suited to the needs of the Icelanders. It was, however, captured by the English on the return journey. The War of 1812 disrupted this trade, but in 1815 Mr. Cruft petitioned the Danish Government to grant him sole American trading rights. On the recommendation of the Danish governor general, who testified that the goods were of value to the Icelanders, and that the price was low, the petition was granted.

Through her alliance with France, Denmark had been a party to the defeat of Napoleon, and as a result by the Peace of Kiel she lost Norway to the King of Sweden in 1814; but no change was made in her relations with Iceland.

Now the question of the interpretation of the treaty of 1262 arose. The Icelanders contended that it had meant only that Iceland and Norway were united under one king, while the Danes contended that a material union was contemplated, and even that Iceland had been incorporated in the Kingdom of Norway and had now the same status with regard to Denmark. When the consultative chambers were established in Denmark in 1834 the Icelanders claimed equal rights for themselves. The King complied with their wishes, first by summoning a commission of the highest officials of the country to make proposals concerning its interests, and later by establishing a consultative assembly, chosen for the most part

by the Icelanders themselves, which was called the Althing and met for the first time in 1845. By the constitutional law of 1849 the King resigned his absolute power in Denmark; but this law did not apply to Iceland, where the King continued to be an absolute monarch.

Now the old spirit of nationalism began to take on new life. But the aspirations of the Icelanders received a set-back when in 1864 Denmark was defeated by Prussia and Austria, and the provinces of Schleswig, Holstein, and Lauenburg were lost.

Under the leadership of Jón Sigurðsson, the greatest statesman the island produced, the struggle of the Icelanders for independence and a more liberal constitution was continued. The first step ended with the Danish Government passing a law fixing the status of Iceland within the Danish state in 1871. This legislation, opposed by the Icelanders, made Iceland a part of the Danish state, though with special rights, and with their own legislature and government; but in all joint affairs the Icelanders were to have no voice.

In the summer of 1874 Iceland celebrated the one-thousandth anniversary of the first settlement, and in honor of the occasion the King, Christian IX, and his entourage visited the island, bringing with him a new constitution based upon the law of 1871. The Althing was granted legislative powers, together with the king, in all matters concerning internal affairs, and a special minister was appointed to be resident in Copenhagen. But this did not wholly satisfy the Icelanders. Bayard Taylor covered this event for the New York Tribune, and Samuel Kneeland, another visitor from the United States, was present. Both wrote accounts of their experiences.

The contacts between Iceland and the outside world were now increasing rapidly. The development of steam navigation enabled tourists to visit the island in increasing numbers, and her fishing banks were regularly frequented by schooners from Gloucester, as well as by ships from France and elsewhere. Whaling, formerly carried on offshore, was now undertaken from shore stations of which there were altogether 15, 9 in the northwestern peninsula, 1 in the north, and 5 in the east, operated by Norwegians. There was a considerable immigration of Icelanders to the United States and to Canada, the immigrants settling mainly in Manitoba (New Iceland), Minnesota, and the Dakotas.

Soon after 1874 the constitutional dispute was resumed, and in 1903 a new concession was made. It was agreed, among other things, that the Icelandic minister in the Danish cabinet should be resident in Reykjavík and should act as chief administrative officer in place of a royal governor; also, he must be able to understand and speak Icelandic.

This was the beginning of parliamentary government in Iceland, for the minister or ministers (the number was later increased) were to be responsible to the Althing.

In 1905 the complete separation of Norway and Sweden gave the Icelanders fresh hopes.

In July 1918 a commission composed of Danes and Icelanders sat in Reykjavík to draw up proposals for a basis of union between these two peoples. Björn Thórdarson writes that these proposals were subsequently submitted to the legislatures of the two countries, and adopted as a law, which was confirmed by Christian X, King of Denmark and Iceland, on November 30. By this law, which is essentially a treaty between two states of equal standing and with equal rights, a new state was created, the Kingdom of Iceland. Mr. Thórdarson says that in the tumult of World War I and the period following, the outside world, with the exception of the related Scandinavian peoples, probably took very little notice of the event. To the great nations it may perhaps have caused some surprise, and may have raised doubts as to how the inhabitants of this remote island proposed to maintain a separate state, but the recognition accorded to it by the Danish people is sufficient assurance that strong reasons underlay the event. The Icelanders were an ancient people, and an ancient state had simply arisen anew after a period of abeyance.

Since that time conditions in Iceland have steadily improved. Feeling against the Danes, which formerly was as bitter as that of the Irish against the English, has died down.

In April 1940 when the Germans occupied Denmark, the Althing assumed control of Iceland's foreign affairs, and Sveinn Björnsson was elected Regent, which position he still holds. In the following month a British expeditionary force occupied Iceland. On July 7, 1941, by invitation of the Icelandic Government, United States Marines replaced the British force, and the United States Navy agreed to assure safe communications between Iceland and the United States.

#### LANGUAGE

Iceland has its own language spoken nowhere outside of Iceland except by those Icelanders, about 40,000 in number, who reside abroad, chiefly in Canada and the United States. The total number of people speaking Icelandic is about 160,000, or roughly the same as the number of people in Sacramento, California.

Icelandic, one of the oldest living languages in Europe, is the most regular and the purest of the Teutonic dialects, and the one that most



nearly approaches the common language of all the Teutonic tribes of the fourth century, from which English, German, Swedish, Danish, and Norwegian have developed.

Mr. Thórdarson says that

In the course of time Icelandic has undergone some changes in pronunciation and accentuation, but the main change has been in the growth of the vocabulary. Icelandic has great fecundity, and it has always been found possible to form new words and compounds to express new ideas, new activities, and new methods; but since the old vocabulary has also been retained practically without change in the words or inflections, every Icelandic child that is able to read can read and understand the prose of the twelfth and thirteenth centuries as easily as the spoken and written tongue of today. . . . Although the country is so large, and communications have been difficult until recently, there are no dialects in Iceland, and the difference between the spoken and written form is less than in most other languages.

According to Mr. Thórdarson the chief reason for the purity and continuity of the language is undoubtedly the fact that the literature is practically as old as the people itself, and that all have shared in it, high and low, rich and poor, in spite of the sparse population and material difficulties. In addition to this, the foreign power which for centuries ruled over Iceland never made any attempt to interfere with the language, and few foreigners ever settled permanently in the country districts.

Most visitors to Iceland have noted with surprise not only the fact that literacy is universal, but also that knowledge of other languages is widespread. Danish and English, and to a lesser extent German, are understood by a large percentage of the people. In earlier days knowledge of Latin was very general.

The Icelandic language still uses two letters that are no longer found in English. These are the following:

Þ, þ, = *th*; the equivalent of Old English Y, y.  
Ð, ð, = the sound of *th* in "thee."

## LITERATURE

The immortal fame of Iceland springs from its early literature some of which, from the artistic or even from the scholarly point of view, is almost without a rival elsewhere.

Axel Olrik has pointed out that the most important factor in the production of this magnificent literature was the selection of the human stock that settled the island. This stock included all those families of petty kings and peasant chieftains from western Norway who refused to submit to the autocratic rule of Haraldr Hárfagri, together with Norwegians from other sections of the country, stragglers from Sweden, and

Vikings from the West, including some semi-Celtic elements. The largest part of the population came from the districts of Hordaland and Rogaland, the regions that had contributed most to the great Viking Age, and the period of discovery.

As described by Mr. Olrik, these talented and aristocratic people settled in Iceland under more severe conditions of life than they had formerly known. Instead of being a petty king, the peasant had at most a very limited authority as the *goði* of his district. Many a man of noble origin had to settle as a peasant in the *goðorð* of another man. Their external circumstances were narrowed down to obtaining the necessities for existence. The only mark of nobility that they still retained was their mental culture; but this they assiduously cultivated.

In the Icelandic colony of Greenland conditions were even harder; but even here the old traditions were maintained. Professor Einarsson says that one of the Eddic poems is said to be "*grœnlenzkt*," but that is all we know about it directly. Of the two sagas that deal with Greenland and the discovery of Vinland (North America) one, *Eiríks saga Rauða*, or *Þorfinns saga Karlsefnis*, seems to embody Icelandic tradition of the events, while the other, *Grœnlendinga Saga*, probably embodies Greenlandic tradition. But according to Professor Einarsson both sagas were undoubtedly written in Iceland.

The early literature of Iceland is divided into two classes, Eddas and Sagas. Regarding these I cannot do better than quote, more or less verbatim, the description given by Dame Bertha Surtees Phillpotts, D.B.E. (1931). Dame Bertha writes that the term "*Edda*" covers not only the collection of poems known as the Elder or Poetic Edda, but also Snorri Sturluson's Younger or Prose Edda, that very remarkable manual for poets which rearranges and interprets, long after heathen days, much of the ancient lore contained in the Poetic Edda and in some Eddic poems which are now lost.

Saga covers the prose stories of all kinds, from history to romance, which are the special glory of Iceland. The two words together may be taken to include the other main type of Old Norse literature, the verses of the *skalds* or court poets, since almost all that is left of them, whether Norwegian or Icelandic, is preserved by quotation either in the prose sagas or in Snorri's Prose Edda.

But these poems and this prose, Edda and Saga, are something more than the surviving literature of Norway and its settlements in Iceland and Greenland. Many of the Eddic poems, it is true—mainly those which purport to give the utterances of gods or other supernatural beings—reflect beliefs and traditions which, in the absence of all other evidence,

we must consider as specifically Norwegian or Scandinavian. These poems are not the least interesting of the collection, especially since some parts of them seem to reveal the thoughts and the philosophy of a figure who is mute in all other early medieval literature—the peasant or small farmer. But they form only half the collection. The traditions in the other poems—those dealing with human heroes—are not local or national. Though the authors of the poems, as we have them now, were all of Norwegian stock, not one hero in poems preserved in Eddic manuscripts is a Norwegian or an Iclander. A few are Danish or Swedish, but in the main the stories center around kings from the time of the Wanderings of Peoples, or the Heroic Age as it has been called.

The chief historical figures in the poems are Ermanaric, who ruled over the vast East Gothic Kingdom and who died soon after A.D. 370; Attila (Atli or Etzel), the Hun, who struck terror into Europe in the first half of the fifth century; and Theodoric the Goth, who ruled Italy from 489 to 526. The figures of the great Nibelungen story, which has pride of place in Scandinavian as in German memory, are identified with the court of the Burgundian King Gundahari, who was defeated by the Huns in 437. These were the kings whose stories seem to have been the common cherished possessions of the Teutonic peoples.

The Danish and Swedish kings celebrated in Eddic poems are less easy to date, but they probably lived soon after A.D. 500. As far as we can judge, their stories were not known over so vast an area as those of the Gothic and Burgundian kings, but they have a special interest because they are from the same period, and also from the same regions, as the kings sung of by Anglo-Saxon poets in the seventh and eighth centuries.

The last time these stories are retold is in the thirteenth century, in the prose *Volsunga Saga* written in Iceland. But the first poems about these personages must have been composed in the great kingdoms of the Goths, the Burgundians, the Lombards, and perhaps the Franks in the fifth and sixth centuries, in languages of which the literature is now utterly lost to us. Naturally the stories must have been profoundly modified in those 20 or 30 generations, and in passing from one people to another. Yet we may truly say that the Eddic heroic poems represent the ancient thought and experience of the race to which we belong. Without their help we cannot understand the attitude toward life of our own forefathers. The ideas underlying them were the common heritage of the English and Scandinavian peoples. To a great extent they were the common heritage of most of the Teutonic peoples, for a similar attitude toward life can be traced in German stories, especially



in the *Nibelungenlied*, which is a piece of the ancient tradition reshaped in the Age of Chivalry. It was written in what is now Austria in the thirteenth century—about the same time as the Icelandic *Volsunga Saga* which tells the northern version of the same tale. So far flung, both in time and space, are the stories and ideas which have come down to us in the historic poems of the Elder Edda.

Dame Bertha says that at first sight the sagas seem to form the strongest possible contrast to this heroic Eddic literature. The Eddic poems commemorate in verse kings renowned all over Europe, and they preserve a memory of the wealth of the Heroic Age. Glorious weapons are mentioned, and magnificent ornaments, and lavish feasts at which foreign wine is drunk in golden goblets. The activities mentioned are wholly warlike; no one in the heroic poems is concerned with agriculture, or indeed with any occupation other than war and sport. The great kings of the ancient world and their companions are seen through a haze of antiquity and glory.

The only sagas that can in any way be compared with the heroic Eddic poems are the "Sagas of Icelanders," as distinguished from the sagas which claim to be history and the later sagas which are pure romance. The "Sagas of Icelanders" tell in sober prose of the doings of local landowners and their people, men and women who were intimately known to their neighbors, and who were separated by no great number of generations from those who actually committed the stories about them to writing. The treatment is realistic; there is little wealth, little glamor about the scene. The chief persons of the sagas are seen in all the details of their everyday life, getting in their sheep from the mountains, sowing their seed, interested in their crops, involved in litigation over slander or about strayed cattle or disputed boundaries—in fact they are seen as the farmers they were, notwithstanding their habit of carrying arms and their readiness to use them.

The heroes of the Eddic poems were famed from the Black Sea to Greenland; the personages of the Icelandic sagas were celebrated only in their own country. But there is an essential continuity of thought which persists through the diversity of form and subject and treatment. The best of the sagas quite definitely and recognizably inherit what we may call the heroic tradition of the Teutonic peoples. This tradition can be traced among the Goths, the Burgundians, the Lombards, and perhaps the Franks, as well as in England and in Scandinavia. But in all these countries it is to be traced only in the literature that gave it birth—in poems or traditions about far-off kings and heroes who are as remote from ordinary life as the personages of the *Iliad*. It is only in Iceland

that we see this heroic tradition expressed in the speech of everyday life, and at grips with the harsh realities of existence for ordinary men and women. Dame Bertha says that the sagas may well be called the first democratic literature, and they are none the less democratic because they apply to the ordinary man the measure of the heroic tradition, of the royal and heroic figures commemorated in the Eddic poems.

Dame Bertha points out that there is another point which we must bear in mind in considering both Edda and Saga. The tradition is not narrow, or insular, or provincial. But neither are the authors, whether Norwegians or Icelanders. In the period that saw the creation of much of this literature, in the form in which we have it, that is, from the eighth to the thirteenth centuries, the Norse language became current over a large part of Europe. It was spoken, with small local differences, in the whole of Scandinavia, in a considerable area of England, Scotland, and Ireland, in part of France, on the southern and eastern sides of the Baltic, and as far south as the great Swedish Kingdom centered in Kiev, the mother of Russian cities. It became a recognized language in Constantinople (Istamboul), for it was the speech of the Emperor's bodyguard. It was probably used by traders on the shores of the Caspian Sea, though there is no actual record of its being spoken farther east than the river Jordan, in a verse, still extant, uttered by an Earl of Orkney on pilgrimage. Its western limit was Nova Scotia, or perhaps the coast of Massachusetts, for it was the first European language to be spoken in the New World.

The Earl of Orkney, in his verse on the Jordan, observes that it is a long way to Palestine. History records how long and how diverse were the ways which were trodden or sailed by these northern peoples, but Dame Bertha remarks that perhaps the imagination is more readily stirred by inscriptions cut in their own Runic alphabet on rocks or great boulders set up to the memory of the dead. There is a Runic stone on the island of Berezanij in the Black Sea. There is a Runic inscription carved on the marble lion that adorned the Greek harbor at Piraeus and is now at Venice. Two score or so of stones still stand in Sweden commemorating men who fell in far-off countries in the tenth and eleventh centuries. On one of these, at Gripsholm, we read "Tola had this stone raised to the memory of her son Harald, Ingvar's brother. Gallantly they sought gold afar, and sated the eagle in the East. They perished south in Arabia." The most remote of these stones is found far to the north in west Greenland, on the shore of Baffin Bay.

Wherever these peoples settled the stories and ideas incorporated in the Eddic poems went with them. We know this, although the poems were written down only in Iceland.





# PLATE 10

Upper: Eskifjörður, an eastern Iceland village. Photograph by Björn Björnsson. (From Ísland í myndum.)

Lower: Many waterfalls are formed where the streams from the lava plateau plunge over its bounding escarpment. The lava banks show the typical columnar structure formed in many lava flows as they cool. Courtesy Canadian Geographical Journal.







# PLATE 11

Of all the Nordic peoples, the Icelanders have the least admixture with other races.

Left: Icelandic girl in national costume. Photograph by Vigfús Sigurgeirsson.

Right: An Icelandic sailor. Photograph by Guðbjartur Asgeirsson.

(From Ísland í myndum.)







PLATE 12

Left: Haifoss (High Falls). Note figure of man on rock in right center. Photograph by Ólafur Magnússon.

Right: Iceland gyrfalcon, the most famous bird in falconry. Photograph by H. J. Sherlock.

(From Ísland í myndum.)

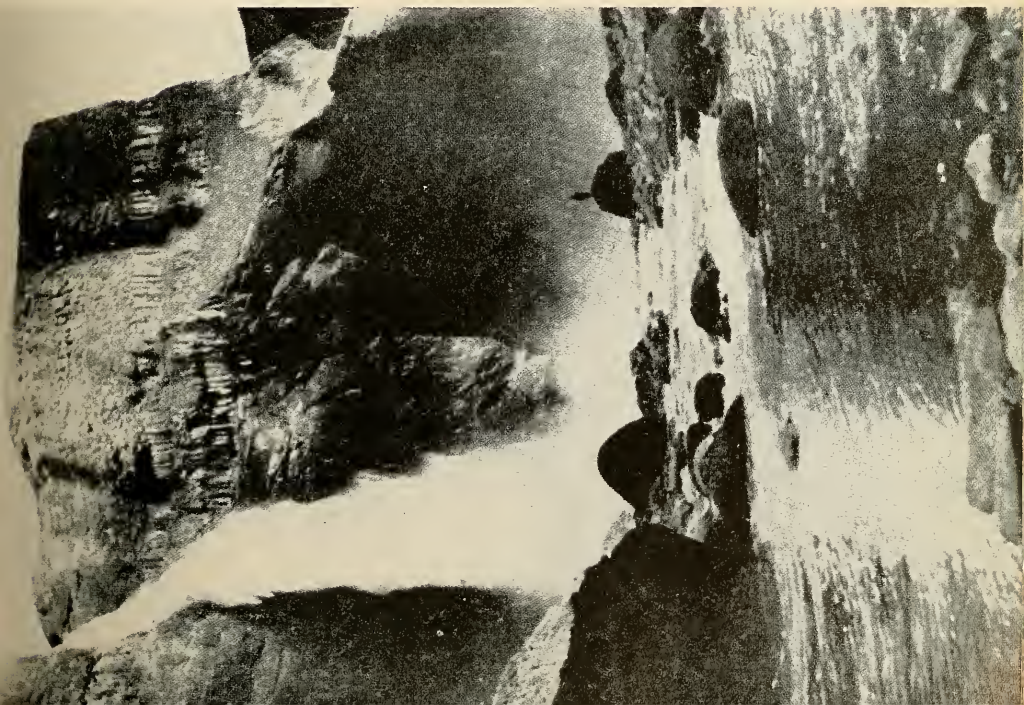






PLATE 13

Upper: Vestmannaeyjar, an important town in southern Iceland. Photograph by Sigurjón Jónsson.

Lower: Ísafjörður, one of the important towns of the northwest peninsula. Photograph by Vigfús Sigurgeirsson.

(From Ísland í myndum.)





Old Norse literature belongs to a time when Norse was one of the most widely spread languages of Europe. Dame Bertha says that we must not think of it as a language spoken chiefly by peasants and barbarians. It was the speech of men who established towns and commerce wherever they went, of brilliant administrators, of legislators whose word "law" superseded the old English "doom"; of conquerors who saw, hundreds of years in advance of their time, that a free tenant was better than a serf; and of men who, in Normandy, laid the foundations of the most highly organized state in Europe, and prepared the way for the Norman conquest of England.

The epoch celebrated in the Icelandic sagas begins with the first settlement in 874 and runs until 1030, and the earliest of the saga writers was Ari Þorgilsson fróði, a descendant of Queen Audr, widow of the King of Dublin. Professor Einarsson points out that Ari was the first to write vernacular historical prose, which was no mean achievement in an age when the custom was to write history in Latin. He writes that the form of the saga and also the style may be said to have reached perfection in the works of Snorri Sturluson (1178-1241), poet, historian, and chieftain, and the greatest figure in old Scandinavian literature. He was the author of the *Snorra Edda*, an *ars poetica* containing old Icelandic mythology; of *Heimskringla*, the Chronicle of the Norwegian Kings; and, as is now held by many scholars, of the *Egils Saga*, one of the most original of the Icelandic sagas.

Sir Edmund Gosse writes that, unlike England and France, Iceland has had only one golden age in literature upon which all her fame must rest. Of its creations it has been truly said that they fill a place none others could take in the high ranks of the Aryan classics. The noblest of them are distinguished by pure and strict form, noble heroic subject, and simple, truthful, self control of style and treatment, free alike from overwrought sentiment or extravagant passion, and raised equally above euphemism and commonplace, but ever inspired by a weird Æschylean power, grim and tender, and splendid as that which breathes through those historical books of the Old Testament, to which alone the masterpieces of Iceland's greatest writers should be compared.

Almost every educated European and American knows at least a little about old Icelandic literature, especially the sagas. Many writers from other lands have visited Iceland to familiarize themselves with the country from which these masterpieces flowed. Among our own poets Longfellow was especially influenced by the old Icelandic writings. Fifty years ago William Morris went so far as to suggest that a portion of Icelandic literature should be to the British what the tale of Troy is to the Greeks.

At different times the Icelandic writings have played an important part as a basis for nationalistic movements, first in Sweden and Denmark, later in Norway, and still later in Germany.

Although properly speaking not a part of Icelandic literature, it may be mentioned, as noted by Dame Bertha Phillpotts, that a twelfth-century Icelander, "Star" Oddi, made observations leading to a more accurate determination of the equinoxes than was attained by any German or English calendar of the time, and that in calendral computations Bjarni the Mathematician, who was at school before 1121, was in advance of all western Europe.

The literary and scholarly traditions of Iceland have continued unimpaired to the present day, and with improved conditions the printed output, particularly of cultural and scientific books and books dealing with localized areas, has increased, especially in the past 15 years.

Modern Icelandic literature is vigorous, abundant, and varied, consisting of novels, short stories, and poems, many of which have been translated into other languages. There are also numerous children's books. The interest of the Icelanders in matters outside their own country is as active now as in the past. There are Icelandic translations of many foreign books, especially from the English, among which may be mentioned works by P. G. Wodehouse, H. G. Wells, Bertrand Russell, Paul de Kruif, Rudyard Kipling, Jack London, Mark Twain, Maxim Gorki, Pierre Loti (Louis Marie Julien Viaud), Maurice Maeterlinck, Sir Arthur Conan Doyle, Rex Beach, Ella Wheeler Wilcox, and Jules Verne. Interest in foreign personalities is shown by Icelandic accounts of Winston Churchill, Īsoif Stalin, Adolph Hitler, Mohandas K. Gandhi, Jiddu Krishnamurti, and Shirley Temple.

There are a number of women authors in Iceland, among whom may be mentioned Þórunn Magnúsdóttir,<sup>2</sup> Elínborg Lárusdóttir, Guðrún Lárusdóttir, Helga Sigurðardóttir, Jónína Sigurðardóttir, Guðlaug Benediktsdóttir, Guðrún Jónsdóttir, Þórunn Astríður Björnsdóttir, Guðrún Jóhannsdóttir, Guðrún Helga Finnsdóttir, and Theódóra Þórðardóttir. There are also a number of women editors and translators.

The volume of books, pamphlets, and periodicals produced annually in Iceland is almost unbelievably large. In Reykjavík, which is about the size of Lynchburg, Virginia, the annual output of books has averaged over 120 for the past 15 years, and there are at present 3 daily papers (there have been as many as 5), besides weeklies and other periodicals. In Akureyri, which is about the size of Millinocket, Maine, the annual

---

<sup>2</sup> In Icelandic the ending *-dóttir* is the feminine of the ending *-son*.

output of books for the past 15 years has been about 15. Books are also published in many of the towns of lesser population. There are very numerous periodicals of all kinds in Iceland. In the past 15 years there have been about 275, though many of these ran for only a few numbers.

Professor Einarsson says that the love of literature and bookishness characteristic of the Icelanders has been nowhere more graphically shown than in Canada. A very considerable amount of Icelandic literature is published in Canada, especially in Winnipeg. Of Canadian poetry published in languages other than English by far the greatest amount is in Icelandic and Ukrainian. There is a little more in Ukrainian than in Icelandic, but there are about 10 times as many Ukrainians as Icelanders in Canada.

The quality of the Icelandic poetry published in Canada is very high. Stephan G. Stephansson, who died in 1927, was not only one of the greatest of Icelandic poets, but also Canada's leading poet. Indeed, he was called by the late Prof. Frank Stanton Cawley of Harvard the greatest poet of North America. The preeminence of Icelandic poets in Canada recalls the ancient preeminence of Icelanders as court poets in Europe.

Prof. Halldór Hermannsson notes that in recent years the output of scientific books has noticeably increased. The Icelandic Academy of Sciences (*Visindafélag Íslendinga*), founded in 1918, has published 24 volumes, the contents being mostly in English, with a few in German. There is another scientific series of recent origin issued by the newly established Research Institute in the University of Iceland. Then there is the series "*Statistique de l'Islande*" (*Hagskýrslur Íslands*) of 107 volumes. The elaborate series of memoirs on "*The Zoology of Iceland*" (*Copenhagen and Reykjavík*) edited by A. Friðriksson and S. L. Tuxen, of which 33 parts have appeared (all in English), may be mentioned. In 1928 the Old Icelandic Text Society (*Hið íslenska Fornritafélag*) was founded with the object of publishing in 35 volumes popular, yet scholarly, editions of the old literature. Eight volumes in this series have now appeared, all edited by Icelandic scholars. A series of monographs (*Íslenzk fræði*) dealing with Icelandic literature, language, and history has recently made its appearance under the auspices of the Philosophical Faculty of the University of Iceland. These volumes are written in Icelandic, with *résumés* in one of the more widely used languages. In various districts societies have been formed with the purpose of publishing descriptive works of all kinds concerning the districts.

Professor Hermannsson says that while a few books with illustrations by native artists had been published in Iceland, especially after the end of the nineteenth century when great interest in art had been awakened,



the production of illustrated books was handicapped by the absence of an engraving establishment. The first establishment of this kind was opened in 1919, and since then a number of highly competent illustrators have appeared. Now there is even a humorous illustrated periodical (*Spegillinn*), with cartoons as well as other pictorial material, which was established in 1926.

The Icelanders are great readers and eager for information, and Professor Hermannsson says it seems doubtful if, in the present state of the world, they can be supplied with sufficient translations to satisfy the demand. They have now been drawn into the midst of world affairs, and must keep abreast of events and currents in the outside world to an extent not necessary heretofore. In order to do this they will have to depend more and more upon books in foreign languages. Professor Hermannsson points out that geographically and commercially they are drawn toward the English-speaking peoples, and must be well acquainted with English. Historically and culturally they are one of the Scandinavian group of nations, so they must know at least one of the Scandinavian languages besides their own. Thus it is necessary for them to be in fact trilingual. Whether the Icelandic language can in the long run maintain itself under such conditions Professor Hermannsson says only time will show.

#### MODERN ICELAND

Within the past score of years great changes have come over Iceland. Her commerce has become integrated with that of the northern world in general, thousands of tourists have visited the country, and many Icelanders have visited other lands. As a natural result, she has to a large extent awakened from her isolation and has developed into a thoroughly progressive modern nation, quite as modern as any of the other nations of modern Europe.

The population of Iceland in 1941 was 121,618, distributed among towns, villages, hamlets, and more or less isolated farms. The capital and chief town is Reykjavík in the southwest, with a population of 39,739—about the same as that of Quincy, Illinois, or Norwalk, Connecticut. The population of Reykjavík less than 20 years ago (1925) was only 21,000, and 40 years ago only 6,600. Other towns of special interest are Ísafjörður (2,826); Siglufjörður (2,833), the center of the herring industry; the beautifully situated Akureyri (5,357); Seyðisfjörður (882); Vestmannaeyjar (3,410); Hafnarfjörður (3,718), and Neskaupstaður (1,082).

Iceland has over 3,000 miles of motor roads with about 330 bridges, on which, especially in the southern lowlands, motor vehicles are the chief means of transport. Most of the large rivers and many of the smaller ones have been bridged. But in large sections of the country ponies are still the chief means of travel and of transport. There are no railways. For coastal traffic both steamers and motor boats are used. Within the past few years regular plane service has been established between the chief towns.

There are 240 post offices and 200 telephone offices, in addition to telegraph offices, 6 wireless stations, and a broadcasting station. Communication with the outer world is maintained by submarine cable and by wireless telephone.

Before the war steamship communication was regularly maintained with Bergen, Copenhagen, and a number of English and Scotch ports by three steamship lines, one of which was Icelandic.

The opening up of communications, both internal and external, is only one phase of a resurgence of that energy and initiative which, though in the past often suppressed, has always characterized the Icelanders. Perhaps the most interesting example of this is seen in the ingenious way in which the people have developed their local resources. The island lacks fuel, except for scattered deposits of low-grade coal which it does not pay to work, and some often inferior peat. But in compensation it has a great number of waterfalls which provide water power for the industries, and electricity. It is estimated that the available water power amounts to 4,000,000 horsepower, of which only about 25,000 horsepower is now utilized. The largest power station Ljósafoss, provides electricity for Reykjavík and its vicinity. Most of the towns and villages, and even isolated farms, are now lighted by electricity. Where this is not available, kerosene is used for illumination. Peat is still the principal fuel, but in Reykjavík gas is commonly used for cooking.

In 1920 the Alafoss Cloth Mills tried the experiment of heating their buildings by piping to them water from the hot springs. This was the first attempt to apply this method on a large scale, and it proved successful. Some of the homes and greenhouses in Reykjavík are now heated in this way, and by the end of this year it is expected that the whole city will be heated by natural hot water. As a matter of curiosity, it may be mentioned that houses heated with natural hot water and using electricity for cooking do not need chimneys. Fed by water from the hot springs, extensive garden plantations have been developed in which it is possible to grow even semitropical products.

In the towns and villages most of the houses used to be built of

wood and roofed with corrugated iron. But this type of building has now been replaced almost wholly with concrete, usually throughout, though floors and partitions may be of wood. The construction of concrete houses has reached a very high degree of perfection in Iceland. In the rural districts the most common form of dwelling house is still the *bær*—a group of houses with earthen walls and wooden gables, the interior walls being lined with matched boards.

The fisheries and agriculture are the chief means of livelihood in Iceland. In 1925 the Icelandic fishing fleet, exclusive of open boats, included 36 steam trawlers, most of them large and modern; 33 long-liners; 62 motor vessels of 30 tons or more; 560 motor vessels of less than 30 tons; and 20 sailing ships of various sizes. The fish exports in that year were 50,000 tons, and 254,110 barrels of herring. The most important fish is the cod. Each dry-salted cod is rigidly examined by a government inspector before its export is permitted, so that a uniformly high quality is maintained.

The agricultural industries consist mainly of sheep raising and dairy farming, and the chief agricultural exports are mutton, wool, and sheepskins. Some butter and cheese are also exported.

At the time of the outbreak of the war the bulk of the trade was with Denmark, Great Britain, and Spain. More than two-thirds of the imports have come from Denmark and Great Britain, and almost exactly one-third of the exports went to Spain. The three next important countries were Norway, Sweden, and Italy.

Reykjavík, the seat of government, is a thoroughly modern city. Among the institutions of interest are the National Museum, the Einar Jónsson Sculpture Gallery, the National Library, including 100,000 printed volumes and about 8,000 manuscripts, many of which are of great value, and the University. Of special interest to Americans is a colossal bronze statue of Leifr Eiríksson by A. Stirling Calder, a gift from the Congress of the United States in commemoration of the thousandth anniversary of the establishment of the Althing in 930.

Educational standards in Iceland have always been high. There is no illiteracy. The standard of education is well illustrated by the fact that in Iceland there is one publication for each 466 of the inhabitants, while the number in Denmark is 1,106; in Norway 1,558; in Sweden 2,309; in Britain 3,205; and in the United States 12,497. The Icelanders therefore publish 27 times as much per capita as the United States. The present schools are municipal and state schools, and instruction is free, or practically so. Attendance in the elementary schools is compulsory up to the age of 14. From the elementary schools the system is progressive,



terminating in the University. The University was founded in 1911 and has four faculties, theology, law, medicine, and arts.

The present Icelandic Althing is composed of varying numbers of members not exceeding 52. The Prime Minister and his cabinet are responsible to the Althing. The judicial authority consists of the Supreme Court with five judges, and the Lower Courts each with one judge, from which appeals lie directly to the Supreme Court.

Iceland has no army and no navy.

As late as 1872 Lord Bryce recommended that only two kinds of people should visit Iceland, those interested in Scandinavian history and literature, and those who belong to that happy and youthful class which enjoys a rough life for its own sake. It is to be regretted that this good friend of the country and its people did not live to see the modern Iceland.

#### SELECTED BIBLIOGRAPHY

The literature on Iceland, mainly in the Scandinavian languages, English, and German, is very extensive and widely scattered. Those who are especially interested in Iceland should consult the Catalogue of the Icelandic collections bequeathed by Willard Fiske, Cornell University Library, vol. 1, 1914, vol. 2, 1943, compiled by Prof. Halldór Hermannsson, and also *Islandica*, vols. 1-29, 1908-1942, edited by Professor Hermannsson.

In the preparation of the preceding pages I have been most kindly and generously assisted by the Hon. Thor Thors, Minister of Iceland in Washington, by Henrik Björnsson, first secretary, and by Prof. Stefán Einarsson, of the Johns Hopkins University, Baltimore, Md.

#### INDIVIDUAL BOOKS

ANDERSON, SVEN AXEL.

1936. *Viking enterprise*. New York.

BARING-GOULD, Rev. SABINE.

1863. *Iceland, its scenes and its sagas*. London.

BECK, RICHARD.

1943. *Icelandic poems and stories*. Princeton.

BECKETT, JOHN ANGUS.

1934. *Iceland adventure; the double traverse of Vatnajökull by the Cambridge Expedition*. London.

BRUUN, [Capt.] DANIEL.

1918. *The Icelandic colonization of Greenland*. Copenhagen.

BRYCE, Viscount [James Bryce].

1923. *Memories of travel*. New York.

CHADWICK, H. M.

1912. *The heroic age*. Cambridge.

CHAPMAN, OLIVE M.

1930. *Across Iceland*. London and New York.

CRAIGIE, Sir WILLIAM ALEXANDER.

1933. *The Icelandic saga*. Cambridge.

1937. *The art of poetry in Iceland*. Oxford.

DASENT, Sir GEORGE WEBBE.

1861. *The story of Burnt Njal*. 2 vols. Edinburgh.

DUFFERIN, THE MARQUESS OF [Frederick Temple Hamilton Blackwood].

1857. *Letters from high latitudes*. London.

EINARSSON, STEFÁN.

1940. *Shakespeare in Iceland*. Baltimore.

EINARSSON, VIGFÚS.

1942. *Iceland, land of frost and fire*. Ann. Rep. Smithsonian Inst., 1941.

GATHORNE-HARDY, G. M.

1921. *Norse discoverers of America*. Oxford.

GJERSET, KNUT.

1924. *History of Iceland*. New York.

GRAY, EDWARD F.

1930. *Leif Eriksson, discoverer of America, A.D. 1003*. New York.

HERMANNSSON, HALLDÓR.

1928. *Sir Joseph Banks and Iceland*. Ithaca, N. Y.

1930. *The book of the Icelanders (Íslendingabók)* by Ari Thorgilsson.  
Ithaca, N. Y.

HOLAND, HJALMAR R.

1940. *Westward from Vinland*. New York.

HOLME, J. G.

1921. *Icelanders in the United States*. New York.

JOHNSON, SVEINBJORN.

1930. *Pioneers of freedom; an account of the Icelanders and the Icelandic  
Free State 874-1262*. Boston.

JÓNASSON, SIGTRYGGUR.

1901. *The early Icelandic settlements in Canada*. Winnipeg.

JONES, GWYN.

1935. *Four Icelandic sagas*. Princeton.

JÓNSSON, FINNUR.

1930. *Ari Þorgilsson fróði; Íslendingabók* [includes facsimile of AM. 113B  
(Cod. A) fol., with printed text]. Copenhagen.

KER, W. P.

1908. *Epic and romance*. London.

1911. *The Dark Ages*. London.

KIRKCONNELL, WATSON.

1930. *The North American book of Icelandic verse*. New York and Montreal.

1936. *Canada's leading poet, Stephan G. Stephansson*. Toronto.

KNEELAND, SAMUEL.

1876. *An American in Iceland*. Boston.

KOHT, HVALDAN.

1931. *The Old Norse sagas*. New York.

LINDROTH, C. HJALMAR.

1931. Die Insektenfauna Islands und ihre Probleme. Uppsala.

1937. Iceland, a land of contrasts. New York.

MAGNÚSSON, EIRÍKR, and MORRIS, WILLIAM.

1870. The story of the Volsungs and Niblungs, with certain songs from the Elder Edda. London.

OLRIK, AXEL.

1930. Viking civilization. London.

OSTENFELD, CARL HANSEN, and GRÖNTVED, JOHS.

1934. The flora of Iceland and the Faroes. Copenhagen.

PHILLPOTTS, [Dame] BERTHA S.

1923, 1932. The life of the Iclander Jón Ólafsson, traveller to India. 2 vols. London.

1931. Edda and saga. New York and London.

SNORRE STURLASON.

1932. Heimskringla, or the lives of the Norse kings. Cambridge.

SNORRI STURLUSON.

1931. Codex wormianus (the Younger Edda). Copenhagen.

1940. Codex regius of the Younger Edda. Copenhagen.

STEFÁNSSON, JÓN.

1907. Iceland, its history and its inhabitants. Ann. Rep. Smithsonian Inst., 1906.

STEFÁNSSON, VILHJÁLMUR.

1939. Unsolved mysteries of the Arctic. New York.

1939. Iceland, the first American republic. New York.

1940. Ultima Thule; further mysteries of the Arctic. New York.

TAYLOR, BAYARD.

1874. Egypt and Iceland. New York.

THÓRDARSON, BJÖRN.

1941. Iceland, past and present. Oxford.

THÓRDARSON, MATTHIAS.

1930. The Vinland voyages. New York.

THORSTEINSSON, THORSTEINN.

1926. Iceland. Reykjavík.

VAN DOREN, MARK.

1928. An anthology of world poetry. New York.

YATES, ELIZABETH.

1940. The quest in the Northland; Iceland adventure. New York.

#### JOURNALS AND REPORTS

American Geographical Society (Research series). New York.

The Danish *Ingolf*-Expedition (chiefly in English). Copenhagen.

Geographical Journal (Royal Geographical Society) (see index volumes). London.

Geographical Review (American Geographical Society). New York.

Hagskýrslur Íslands (Statistique de l'Islande) (in French). Reykjavík.

Islandica. Ithaca, N. Y.



Journal of English and Germanic Philology. Urbana, Ill.

Meddelelser om Grønland (largely in English). Copenhagen.

National Geographic Magazine (National Geographic Society) (see index volumes).  
Washington.

Scandinavian Studies and Notes. Lincoln, Neb., and Urbana, Ill.

Viking Society for Northern Research (or Viking Club). London.

Vísindafélag Íslendiga (scientific memoirs mostly in English). Reykjavík.

Zoology of Iceland (in English). Copenhagen and Reykjavík.

NOTE.—Most of the pictures of Iceland are taken, with the kind permission of the Legation of Iceland, from *Ísland í myndum*—Through Iceland with a Camera, Reykjavík, 1943.

## GREENLAND

### PREFACE

Just as Iceland is the westernmost outpost of Europe, so Greenland is the easternmost outpost of America, the Denmark Strait forming the only significant dividing line between the northern portion of the Old and New Worlds. Among the animals and plants, those that are not of general distribution in all Arctic regions are predominantly European in Iceland, predominantly American in Greenland. In prehistoric times Iceland was uninhabited, and her present population is entirely of European origin. The original inhabitants of Greenland represented the easternmost extension of a people, the Eskimo, occupying all the habitable regions of the far north from Greenland across North America to north-eastern Asia. The first Europeans came to Greenland as colonists from Iceland.

### DESCRIPTION

Greenland is the largest island in the world. From its most northern point, Cape Morris Jessup, in latitude  $83^{\circ}39' \text{ N.}$ , as determined by Admiral Robert E. Peary, it extends southward for 1,650 miles to Cape Farewell in latitude  $59^{\circ}46' \text{ N.}$  Its length is slightly greater than the touring distance from Boston to Miami, or slightly less than that from New York to North Platte, Nebraska. In shape it is roughly triangular, with the greatest width, 690 miles, in about latitude  $77^{\circ} \text{ N.}$ , thence tapering irregularly to Cape Farewell. Its area is 736,518 square miles, or approximately that of Texas, New Mexico, Arizona, California, and Utah combined; but most of this area is covered by the inland ice, the portion beyond the inland ice being only 131,924 square miles, or an area somewhat greater than that of New Mexico. The northernmost point of Greenland is the nearest land to the North Pole, only 439 miles away, while the southern tip is in the same latitude as the Shetlands, Oslo, Leningrad, and the Kenai Peninsula in southern Alaska. The coast line is extremely irregular, being almost everywhere deeply incised by fjords, many of which extend inland as far as the inland ice.

The most characteristic feature of Greenland is the immense ice cap which covers about 86 percent of its surface. This ice cap is of special interest because of its resemblance to similar ice caps that covered large areas in northern North America and northern Europe during the Pleistocene or Ice Age. By far the greater part of this ice-covered area is





included in the continuous ice sheet known as the inland ice, but beyond the borders of the inland ice there are several ice caps, some isolated, others more or less completely merged with it.

The inland ice rises to its greatest height, about 10,000 feet, in north-central Greenland in latitude  $75^{\circ}$  N. There appears to be another elevation of about 9,300 feet north of Angmagssalik, and a third of about 8,300 feet in the south, in latitude  $65^{\circ}$  N. From these centers of greatest altitude the ice slopes gradually down to the edges, which in most places are about 1,600 feet above sea level. But the marginal contour is rather irregular. The great fjord glaciers continue as depressions far into the inland ice. Where the inland ice is bounded by ice-free land the outer border usually forms a vaulted plane the inclination of which may either be so slight that a dog sledge may be driven up it, or it may be so steep that it is impossible to climb it. In certain places the edge forms a vertical cliff.

As the shore is approached from the sea in the Melville Bay region the inland ice stands out in its full grandeur. Along the stretch of coast from Cape York to Wandel Land, about 233 miles, the inland ice reaches the sea in about 70 places, and forms the coast for more than 186 miles. According to Dr. Lauge Koch, more than half the total ice front may be considered stationary, the remainder having the character of glaciers. Seven of these glaciers—Steenstrup, Nansen, King Oscar, Peary, Holm, John Ross, and Wulff—have a frontage of more than 6 miles. Icebergs are given off especially from the three first, as well as from the Dietrichson glacier. Most of the small glaciers do not produce icebergs.

Rising above the inland ice near its outer borders are occasional mountain tops, sometimes of considerable area. These mountain tops protruding from the ice are called *pingos* in the north and *nunataqs* in the south.

In the Upernivik District there is a fringe of islands between the inland ice and the open sea, though a fifth of the total ice front in this region reaches the water. Here the Giesecke and Upernivik glaciers are among the largest. In the southern part of the district the islands coalesce into large land masses which, like peninsulas, project from the ice-covered mainland. Farther southward the margin of the inland ice retreats inland so that there is an ice-free shore strip which, in certain places, is as much as 95 miles in width. This ice-free coast is interrupted, however, by Nordost Bay and by Disko Bay which extend almost to the margin of the ice, and into the innermost ramifications of which some of the largest glaciers of the west coast deliver their enormous production of icebergs.

In the Godthaab District many glaciers extend from the inland ice to the heads of the fjords, and at the southern boundary of this district, in latitude  $62^{\circ}30'$  N., the inland ice sends a huge lobe, the Frederikshaab Iceblink, nearly 12 miles across, almost to the sea. South of the Frederikshaab Iceblink the coast land narrows to about 22 miles until, in the Julianehaab District, the coast turns eastward. Here there are many islands, and in many places glaciers from the inland ice come down to the sea. The glaciers in the interior of Sermilik Fjord produce very large and numerous icebergs. South of latitude  $61^{\circ}$  N. there is no continuous inland ice, but only more or less extensive local névés. Here the most pronounced features of the landscape are the mountains, and not the ice.

Along the southern part of the east coast, as far as Igdluarssuk, the mountains are so high that the inland ice cannot push out to the coast, but large numbers of glaciers extend out to the long fjords. Between Igdluarssuk and Angmagssalik the ice almost everywhere comes to the sea, partly as broad glaciers extending outward between tall pointed nunataqs, and partly as an infinite shining white level plain. But farther north, from about latitude  $65^{\circ}30'$  N. to Agga Island, the inland ice is separated from the sea by an ice-free strip from 6 to 25 miles wide.

Along the north coast of Greenland there are considerable areas of ice-free land. The inland ice does not extend so far as Peary Land, though there are local ice caps there. In north Greenland generally it touches the sea only at the heads of the large fjords which cut far into the country and are continued inward as depressions in the inland ice.

The glacier ice is usually filled with an immense quantity of small bubbles of air under strong pressure, so that sometimes even pressure with a needle is sufficient to burst a large piece with a crack like an explosion. Quite commonly an iceberg will crumble into innumerable fragments from the explosive action of these small bubbles. When the top of an iceberg is "rotten" it may topple if a shot is fired nearby, or even at the sound of a voice. For this reason the Greenlanders always keep perfectly quiet when they are obliged to pass an iceberg at close quarters.

The rate of movement of the glaciers running outward from the inland ice is very much greater than that of the Swiss glaciers, or the glaciers from the local Greenland ice caps. In southern Greenland a number of glaciers have been found to have a flow, in the center, of about 65 feet a day. The Upernivik glacier was found to move at the rate of about 125 feet a day, and the Frederikshaab Iceblink at the rate of 10 feet a day. The movement of the northern glaciers is much slower than that of the southern.

The ice-free area of west Greenland amounts to 44,787 square miles, about the same as the area of Pennsylvania or Louisiana. It is a mountainous region, although the mountains are only of moderate height. Most of the prominent peaks are between 3,940 and 5,250 feet in height, only a few in the Julianehaab District and about Nordost Bay exceeding 6,560 feet. The highest peak of west Greenland, 7,230 feet in height, about 600 feet higher than Mount Mitchell in North Carolina, our highest peak east of the Rockies, is on the great peninsula south of Tasermint and Lindenow Fjords, only 46.5 miles north of Cape Farewell, and about midway between the west and east coasts.

Dr. Kaj Birket-Smith says that though the actual mountains are more or less negligible when compared with the Swiss Alps,

the Greenland scenery can hold its own against any other. Glittering fjords with majestic icebergs, promontory upon promontory standing softly silhouetted against the pale gold of the midnight sun, here and there a jagged crest towering above the glowing snowfields of the peak—a thousand features melting into a mute symphony of purity and a peace that passes all understanding.

In typical west Greenland scenery plateaus and hills are far less common than evenly rounded mountains. There are innumerable streams, but no large rivers. Most of the streams are rapid and turbulent, rushing along through narrow beds and falling from the hanging valleys into the main valley or into the fjord. There is a multitude of ponds and lakes of various sizes, the largest of which is Lake Giesecke, 31 miles long and only 33 feet above sea level. Several of the lakes are situated in the immediate vicinity of the inland ice, so that the latter discharges icebergs into them.

The ice-free area of east Greenland is about one-third that of the entire ice-free region, and one twenty-second of that of the whole island—about the size of Portugal. Here the ice-free land is of very varying breadth, the inland ice in places coming down to the sea, while in the region of Scoresby Sound the distance from the sea to the margin of the inland ice is about 186 miles, and at Franz Joseph Fjord 155 miles. Broadly speaking, the ice-free coasts are narrower toward the south than toward the north, the reverse of the conditions in west Greenland. The coast is extremely irregular, with innumerable fjords and peninsulas, and thousands of islands, islets, and skerries. The greater part of the region consists of mountainous land, often rugged and alpine, sometimes mesa-like, though there are lowlands of considerable extent. In general, east Greenland is higher than west Greenland, and the mountains often rise to great heights very near the coast. Mount Forel, north of Angmagssalik, is estimated to be 11,286 feet in height, and if this is correct it is the



highest mountain in Greenland. Mount Petermann, in Franz Joseph Fjord, according to Nathorst, is 9,186 feet in height. On the Blosseville coast Mount Rigny is 7,825 feet high. There are many mountains with a height of more than 6,500 feet.

In north Greenland the ice-free land, though generally rough and rugged, is not very high. In many places in the western portion the inland ice reaches the sea, but in the extreme north, especially in Peary Land, there are large ice-free areas. The central portion of Peary Land is high, the mountain peaks having a height of from 3,300 to 6,500 feet, occasionally more. On the north coast there are four glaciers, large portions of which float on the sea. The largest is that of Petermann Fjord. Including the depression, this glacier has a length of 125 miles, of which the outermost 25 miles floats on the water.

#### ICEBERGS

Characteristic of the Greenland seas are the icebergs. These huge masses of ice, together with a great amount of water, represent the wastage from the glaciers. The largest icebergs come from the west coast north of latitude 69° N., or from the east coast south of that latitude. Icebergs are produced throughout the year, but for more than 6 months are penned up in the fjords by the winter ice. In spring this disintegrates from outside inward toward the shore; finally the narrowing belt of winter ice becomes too narrow to withstand the pressure of the penned up icebergs and "calved" ice, and breaks suddenly, the whole mass rushing out of the fjord with great speed. The Danes call this the "shooting out" of the fjord.

The tallest icebergs originate in Jacobshavn glacier, and are often more than 330 feet in height, sometimes as much as 450 feet. Hammer estimated the volume of the largest iceberg encountered in Jacobshavn as 1,000 million cubic feet. The icebergs of the east coast do not reach the height of the tallest ones of the west coast. Amstrup estimated that the largest icebergs of the east coast were from 165 to 215 feet in height, and about 3,280 feet—considerably more than half a mile—in length. The cubic content of one that he measured he gave as 212,000,000 cubic feet, or 7,851,481 cubic yards, nearly twice the volume of the concrete in Boulder Dam. It should be remembered that, enormous as icebergs appear at sea, only about one-eighth of their total bulk is above the water.

Helland estimated that the yearly production of icebergs from the Torssukátak glacier is 2.3 cubic kilometers, or about 0.55 cubic miles, and from the Jacobshavn glacier 5.8 cubic kilometers, or about 1.4 cubic



PLATE 14

Upper: Akureyri in spring. Photograph by Steinþor Sigurðsson.

Lower: Siglufjörður, center of Iceland's herring industry. Photograph by Vigfús Sigurgeirsson.

(From Ísland í myndum.)





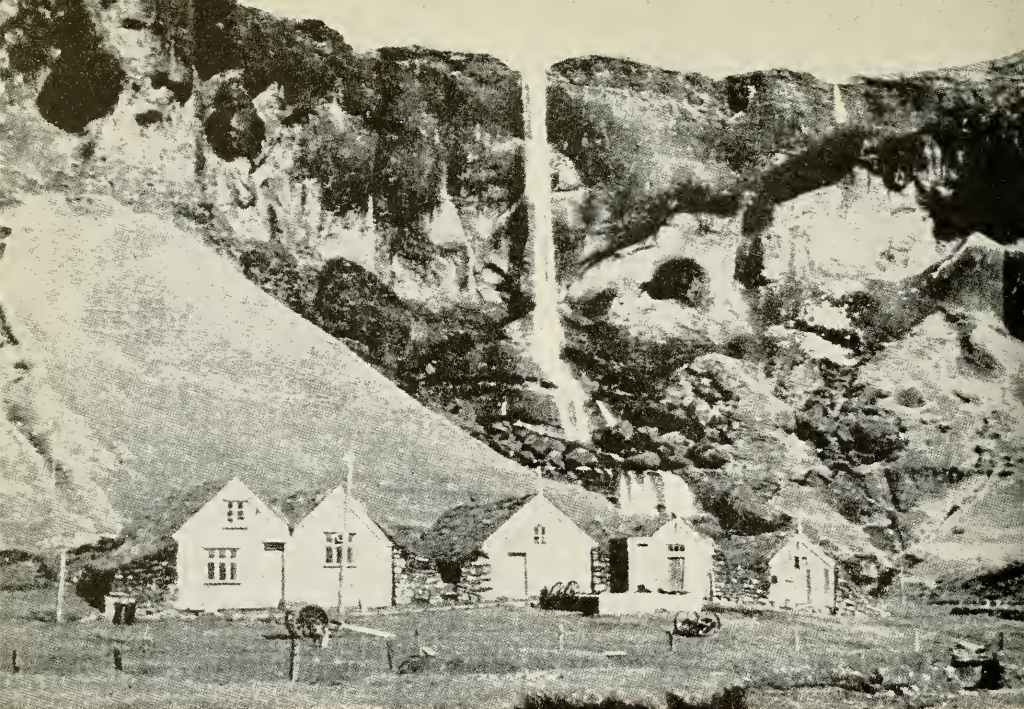


PLATE 15

Upper: Foss (Waterfall) Farm in southeastern Iceland. Photograph by Vigfús Sigurgeirsson.

Lower: A modern farm at Eyjarfjörður. Photograph by Edvard Sigurgeirsson.

(From Ísland í myndum.)







PLATE 16

Upper: Seyðisfjörður, a town in eastern Iceland. Photograph by Eyjólfur Jónsson.

Lower: Fáskrúðsfjörður, an east coast fishing village. Photograph by Björn Björnsson.

(From Ísland í myndum.)







PLATE 17

Upper: Native Greenland boats; a umiak, or woman's boat, and several kyaks. Photograph by Capt. R. A. Bartlett.

Lower: Iceberg off the west coast of Greenland. Photograph by Richard L. Davies.



miles. But Drygalski believed that Helland's estimate, at any rate for the Jacobshavn Icefjord, was far too low; he gave the yearly output of ice from the Great Qarajak as 15.3 cubic kilometers, or 3.67 cubic miles.

### CLIMATE

The climate of the coastal regions of Greenland, as described by Helge Petersen, is everywhere extremely variable, and considerable departures from the mean values are not uncommon. Because of the rugged topography with the deep fjords and outlying belts of islands, local conditions play a considerable part in the climate of any given region, and the climatic conditions in two neighboring areas sometimes differ widely. The low altitude of the sun, as a result of which the difference in the amount of light falling on the south and north sides of mountains and ridges of land is increased, plays an important part in this.

As would be expected, the temperatures are low, the mean temperatures for the year being, at North Star Bay,  $9.1^{\circ}$  F.; at Upernivik,  $16.3^{\circ}$  F.; at Jacobshavn,  $21.7^{\circ}$  F.; at Godthaab,  $28.4^{\circ}$  F.; at Qôrnoq,  $28.76^{\circ}$  F.; at Ivigtût,  $33.1^{\circ}$  F.; at Nanortalik,  $32.9^{\circ}$  F.; and at Angmagssalik,  $28.4^{\circ}$  F. But the annual and monthly mean temperatures vary greatly in different years, the monthly temperatures most widely in January and February, and least in September and October.

At all the stations at which records have been kept, temperatures well above freezing have been recorded in December, January, and February. The highest winter temperatures are recorded for Upernivik, where for February the maximum recorded temperature is  $60.8^{\circ}$  F. and the lowest  $-44.1^{\circ}$ —incidentally the lowest temperature recorded anywhere in coastal Greenland.

In all the summer months the temperature occasionally falls below freezing everywhere except at Ivigtût, where the lowest record for July is  $32.5^{\circ}$ —barely above freezing—and the highest is  $74.1^{\circ}$  F. The highest temperatures recorded for Greenland are  $77.5^{\circ}$  at Angmagssalik in June, and  $77.3^{\circ}$  in the same place in August.

On the inland ice the temperature is always low, never rising above  $32^{\circ}$  F., ranging between  $27^{\circ}$  and  $-49^{\circ}$  F., the last at night. On the dark nunataqs or mountain peaks rising above the ice the temperatures are higher, and some of the nunataqs support a sparse vegetation about which are many kinds of insects, including butterflies.

Precipitation in Greenland is mainly in the form of snow, which occasionally falls in summer, even in the south. The amount of precipitation decreases markedly from the south northward, with increasing



distance from the moist air masses over the Atlantic. Mr. Petersen points out that the annual amount of precipitation at Godthaab and Angmagssalik is very nearly the same as that on the west coast of Norway, while that at Upernivik and Jacobshavn is as small as that measured within the most continental areas of northern Siberia, which were compared by Middendorf to a desert. Everywhere there is a pronounced maximum of precipitation in autumn and a less marked secondary maximum in May. The least precipitation is in summer and winter. The mean precipitation for the year is, at Upernivik, 9 inches; at Jacobshavn, 8.5 inches; at Godthaab, 26 inches; at Ivigtût, 46 inches; at Angmagssalik, 37 inches; and at Danmarkshavn, 6 inches. Thus the annual precipitation in Greenland varies from about that of Little Rock, Arkansas (46.1 inches) to less than that of Phoenix, Arizona (7.6 inches), the driest place in the United States.

Everywhere along the Greenland coasts there is much fog in the summer, though little in the winter. Godthaab and Nanortalik have a considerably greater number of foggy days in summer than the other larger towns because of their location on the open sea.

Thunder and lightning are rare in Greenland. There are no records of thunderstorms for Upernivik, and only a very few for Jacobshavn. Mr. Petersen notes that there are one or two a year at Nanortalik, where they have been recorded for every month except May.

Greenland is a region of comparative calm, especially at Ivigtût and Angmagssalik, where it is calm half the time or rather more. It is most stormy at Godthaab, where the weather is calm only about one-seventh of the time. Winter is the stormiest season.

#### GEOLOGY

The geological history of Greenland, though far from complete, is of great interest. By means of the successive geological formations we are able to trace the history of Greenland back for about 2,000 million years, through a period when it was colder than it is today to a time when the climate was warm temperate, with flourishing forests including many different kinds of familiar and unfamiliar trees, beyond that to a time when conditions over the whole earth appear to have been much the same, and finally to the far distant past long before any life existed.

During the Pleistocene or Ice Age, that is to say for the million years or so preceding the past 25,000, the inland ice of Greenland extended as a continuous sheet over almost the whole of the area now free of ice,

with a few of the highest mountain tops projecting from it as isolated peaks, usually distinguished by particularly steep Alpine forms.

The various deposits of shells found along the coasts show that there were several oscillations of climate between the present time and the Ice Age. Some thousands of years ago when the level of the land was not much lower than it is at the present day the climate was milder than it is now, and certain southern shells lived much farther north. Before that, when the land was lower, the climate was high Arctic. This was preceded by a climate apparently like the present one, which followed the high Arctic climate of the time just after the Ice Age.

Tertiary formations, deposited from 7 to 55 million years ago, occupy a large area in Greenland. The greater part of these formations consist of basalt, which occurs in the same peculiar manner as on Iceland, the Faroes, and certain parts of Great Britain. In west Greenland these deposits are mainly found on Disko Island and on the Nûgssuak and Ivartenhuk Peninsulas. In east Greenland they are extensively developed on the large peninsula south of Scoresby Sound, also occurring on a number of the peninsulas farther north.

In the basalt on Disko Island and in its vicinity are found masses of native iron weighing up to about 25 tons. These masses of native iron are quite distinct from the iron meteorites, first mentioned by Sir John Ross, found near Cape York, three of which, one weighing about 34 tons, were brought to New York by Admiral Peary in 1895 and 1896.

Most interesting are the fossiliferous strata that have been found in various parts of the basaltic formations, either below the basalt or in the lower portion, sometimes reaching a thickness of several hundred yards. In west Greenland the fossiliferous rocks are sandstone and clay ironstone. The fossils are almost wholly of plants, of which the best preserved are in the iron ore. About 300 different plants are represented, of which two-thirds are dicotyledons—willow, bay (*Myrica*), alder, birch, horn-beam, hazelnut, beech, chestnut, oak, elm, plane tree (sycamore or button-wood), walnut, ash, grape, tulip tree (*Liriodendron*), magnolia, maple, holly, and others—the remainder mostly conifers. The most common and characteristic types are the sequoia (now confined to California), and the bald cypress (the species characteristic of our southern swamps). This flora is usually referred to the Eocene, that time about 55 million years ago when the earliest prototypes of our modern mammals, including the earliest known horse, first appeared. The coal layers and slates on Sabine Island contain similar plants. In the area south of Scoresby Sound coal layers have been found only in a few places. The fossils, in a rather

poor state of preservation, consist of the usual plants, and also Eocene crabs, bivalves, and gastropods.

It is evident from the occurrence of these plants that the climate of Greenland in the Eocene, 55 million years ago, was very different from what it is today. It has been estimated from a study of the ranges of comparable plants living today that the mean annual temperature of Greenland at that time must have been somewhere about 53°-54° F., or about that of Atlantic City, New Jersey.

During the Tertiary period violent volcanic action occurred in Greenland, the most violent probably in the earlier part of that period.

We now come to the Mesozoic period, between 95 and 190 millions of years ago, to an unfamiliar world in which such mammals as existed were small and insignificant and reptiles were the dominant vertebrates, at least on land.

It was in the Cretaceous, about 95 million years ago, that the reptiles attained their culmination and the first grasses appeared. Lower Cretaceous deposits are found in east Greenland at Danmark Harbor on the east coast of Koldeway Island, and on the east side of Kuhn Island. They are more widely distributed in west Greenland, where they form the basis of a great number of Tertiary formations on Disko and Nûgssuaq, occurring also on Upernivik Island. The Kome beds of black slates on the north side of Nûgssuaq contain about a hundred different kinds of plants nearly half of which are ferns, the remainder mostly conifers and cycads. The Atane beds, gray and black slates and sandstones, distributed over the whole of the area, contain about 200 species of plants of which nearly half are dicotyledons, including species of bay (*Myrica*), oak, magnolia, plane tree, laurel, breadfruit (*Artocarpus*), and many others, the remainder mostly ferns and conifers.

From a study of the plants of the Kome and Atane beds Prof. O. Heer has deduced a subtropical climate with a mean annual temperature of from 68° to 90° F., very slightly higher than that of New Orleans or Mobile, while the Patoot beds suggest a somewhat cooler climate.

The Jurassic, representing a time 155 million years ago when the first mammals, the first birds, and the first modern trees appeared, occurs in a number of localities in east Greenland, at Danmark Harbor, on Koldeway Island, on Hochstetter Foreland on Kuhn Island, and on Jameson Land. The Triassic, 190 million years ago, the age that witnessed the rise of the dinosaurs, is represented only by a few small occurrences in east Greenland, the deposits containing fossil ferns, cycads, and conifers.

This brings us back to Paleozoic time, when the world was a very



different place from what it is today. The Carboniferous, from 215 to 300 million years ago, saw the rise of echinoderms, sharks, insects, and reptiles, and the first appearance of ferns and seed ferns. The Carboniferous is found only in three small areas in extreme northeastern Greenland. Both the Upper and Lower divisions are represented; in the latter the included brachiopods are closely related to the Russian-Arctic forms. Greenland is the northernmost locality at which Carboniferous plants have been found. Judging from the available evidence the climate of Greenland at this time could not have been essentially different from that prevailing over large portions of the globe.

Devonian sandstones, red, gray, or green, with a thickness of at least 5,000 feet, deposited 350 million or more years ago when the first land animals and first land plants appeared, were described by Dr. A. G. Nathorst from the region of Franz Joseph Fjord; they contain as fossils several kinds of fishes.

Silurian strata, deposited from 390 to 425 million years ago, at the time of the appearance of the first lung fishes and the first relatives of the scorpions, occur in a band along the northern, or outer, border of the Ordovician (see below). The included fauna is most closely related to the corresponding European type. In the greater part of the area in which they occur the strata are horizontal and entirely undisturbed; but in the north they have become highly folded, this folding having taken place in the Devonian. Toward the west the fold continues across Grinnell Land, and toward the east it has its natural continuation in the Caledonian fold across Spitzbergen and thence across Norway to Great Britain. In the western part of the Greenland fold the strata are not highly metamorphosed, so that several of the fossiliferous strata may be identified in it. In this portion the strata form distinct and regular folds. In the eastern part the compression has been far greater, so that the rocks for the greater part have been metamorphosed into crystalline schists, and here granite massifs are found. The central portion of the fold is traversed by a number of eruptive veins, partly of diabase and partly of porphyry.

The Ordovician, laid down from 430 to 480 million years ago, when the first armored fishes appeared, is represented in a narrow, irregular band across north Greenland, mostly bordering the inland ice. It has been studied in most detail along the coast of Washington Land. The strata reach a total thickness of about 2,300 feet. In contrast to the Silurian fossils, which show European affinities, those of the Ordovician are most nearly related to the corresponding American types, or in a few cases are cosmopolitan.

The Cambrian, laid down from 490 to 550 million years ago and including the earliest known marine life, is represented by some small areas on the south side of Kane Basin, a larger area north of Humboldt Glacier, and an area on the south side of Brønlund Fjord. South of Kane Basin the Cambrian formations overlie the Algonkian sediments and eruptives, and the formation here begins with a basal conglomerate and sandstone. This is followed by a limestone, and these strata are finally overlaid by a grayish-yellow limestone. Strata consisting of limestones and conglomerates, frequently without fossils, occupy Daugaard Jensen Land. The fossils, like those of the Ordovician, show American affinities, or are cosmopolitan.

In Greenland there are a number of different sedimentary formations in which no fossils have been found and, as they do not border upon formations of known age, their age cannot be determined.

The remaining rocks of Greenland are older than the oldest rocks containing fossils. Sedimentary formations which with more or less certainty may be referred to the Algonkian, laid down 1,600 million or more years ago, are the Arsuk formation, found near Ivigtût, consisting of highly metamorphosed sediments of various kinds in intensively folded strata, and the extensive sandstone formation in north Greenland described by Dr. Lauge Koch. In the region between Cape York and Cape Alexander the latter is largely red sandstone with basal conglomerate, and frequently with fine ripple marks. In the upper parts there are also other sediments such as limestones, dolomites, slate, and white sandstone. There are no fossils. A similar formation occurs on the coast of Inglefield Land, here consisting chiefly of dolomite and white sandstone. The formation on the south side of Independence Fjord and about Danmark Fjord consists almost exclusively of red sandstone which reaches a height of nearly 3,300 feet. Professor Bøggild believes it probable that these widely scattered occurrences form part of a continuous sandstone plateau beneath the inland ice.

After the deposition of these sediments numerous eruptions occurred. In the western area the eruptions consisted chiefly of diabase in veins and flows, in the eastern mostly of more acid elements. There are a large number of larger or smaller massifs of granite, syenite, nepheline-syenite, or essexite, and others which are of much more recent origin than the granite, although their age cannot be determined with certainty. They are especially common in the most southern part of Greenland.

About half of the area of Greenland not covered by the inland ice is still older—Archean. As the Archean borders the inland ice almost everywhere, Professor Bøggild suggests that by far the greater part of

the area beneath the ice must also belong to it. Only in the far north, from Cape York to Northeast Foreland, where the exposed rocks are all sedimentary, can it be assumed that large areas of later formations underlie the inland ice.

Almost everywhere in the Archean a number of larger or smaller massifs of granite or other eruptives occur. Granite is especially common in the southern part of Greenland, where it is even more abundant than the gneiss. It is usually reported as light gray, not at all schistose, and especially resistant. It is referred to a late Algonkian period.

A few warm springs are found in various places in Greenland. In the basalt area there is one in Disko Fjord with a temperature of about 50° F.; one at Mellemfjord with a temperature of 65° F.; and another on Turner Land, south of Scoresby Sound, with a temperature of 100° F. In summer the springs on Disko have a temperature of from 32° F. to 37.5° F., the water being mixed with great quantities of water from melting ice; in winter the temperature is from 46° F. to 63° F. The hottest springs are found in the Archean area, at Ûnartoq in the Julianehaab District (lat. 60°30' N.), with a temperature of about 104° F., and on Liverpool Island on Scoresby Sound, with a temperature up to 144° F. A fog bank is constantly present over the hot spring at Ûnartoq, as over so many of the hot springs on Iceland.

#### FAUNA

*General features.*—The present land fauna of Greenland is composed chiefly of immigrants which have reached the island since the Ice Age. The great majority of these immigrants reached Greenland from high Arctic North America either by flight, by wind transportation, or by traveling across the intervening narrow sounds and channels which are covered with ice for the greater part of the year. But a few are of European origin. Compared with the land fauna of the extreme north of North America, that of Greenland is relatively poor, as would be expected both from the relatively restricted ice-free areas, and from its remoteness from other regions.

The sea fauna, including those forms of life like the sea birds and the polar bear which are dependent upon it, is exceedingly rich and diversified. The Mackenzie, Coppermine, and other rivers draining the northern portion of North America deliver vast quantities of vegetable detritus and other food materials to the sea to the northward, and by the general easterly drift of the water these food materials are slowly borne to the Greenland coasts, where they support an almost unbelievable amount of marine life from the surface down to the greatest depths.



The number of different kinds of marine animals in the waters about Greenland is not large when compared with the number in any tropical area of equal size, but the number of individuals is vastly greater than it is anywhere within the Tropics. In the Greenland seas the enormous bulk of living substance is contained within the bodies of relatively few types of animals, while in tropical seas a much smaller amount of living substance is distributed among a much greater number of animal types.

*Mammals.*—Thirty-three different kinds of mammals are known from Greenland. Of these, 9 are land mammals, 22 are sea mammals, and 1, the polar bear, with an eastern and a western variety, though belonging to a group elsewhere strictly confined to the land, lives almost entirely on the sea ice and derives its support from the sea, so that it is most logically to be regarded as a sea mammal. All the mammals of Greenland are active throughout the long, dark, and cold winter, none of them passing the winter in the long sleep of hibernation as do most of the bears and many of the rodents with which we are familiar farther south.

Presumably there were no land mammals in Greenland during the Ice Age. All those now inhabiting Greenland are relatively recent immigrants from the high Arctic regions of northeastern North America. They number only nine: the reindeer, closely related to the North American Barren Ground caribou; the musk ox; two kinds of weasels or ermine; the Arctic wolf; the Arctic fox; the collared lemming; and two varieties of the Arctic hare, one in the north and the other in the southwest.

The reindeer, which usually occurs in herds, was formerly distributed over the entire coastal region, except for the north coast; but its range, like its numbers, has been greatly reduced. At present along the west coast it is found only from the southern part of the Upernivik District to the southern part of the Frederikshaab District, most commonly in central west Greenland where the ice-free land is widest and the conditions for its existence are especially good. Reindeer are no longer found in east Greenland, though old antlers and other evidences of their former existence are common. In the northern portion of this region, which is seldom visited by man, their extirpation cannot be attributed to excessive hunting; why they died out is somewhat of a mystery.

The musk ox is met with in small scattered herds. At the present time it is found only on the northern and northeastern coasts, from Cape May on the north to Scoresby Sound on the east, though in the past it was more widely distributed.

The weasels or ermine occur only on the northern coast and on the northern part of the east coast as far as the region around Scoresby Sound,

where they are rather common, though nowhere abundant. They live almost exclusively on lemmings, and consequently have the same range.

At the present time the white Arctic wolf has the same distribution as the musk ox, occurring on the north coast and on the northern part of the east coast as far as the region about Scoresby Sound. It is not at all common.

The Arctic fox is common all along the Greenland coasts. It is especially numerous in east Greenland, particularly north of Scoresby Sound, and in western south Greenland about the deep fjords which rarely freeze in winter, and least numerous on the north coast. Very young ones are blue, but toward autumn some of them become white. The blue foxes are more numerous than the white, but the proportion between blue and white ones varies greatly from place to place.

The collared lemming lives only on the north coast and along the northern portion of the east coast as far as the region of Scoresby Sound. It is abundant wherever there is sufficient vegetation to support it.

The Arctic hare lives everywhere along the Greenland coasts except in the southeast from the Blossville coast to about latitude  $60^{\circ}30'$  N., although in most places it is not very common. Although it keeps mostly to the interior, where it prefers fairly steep slopes, it may be found in rocky regions along the coasts.

Living both on the land and on the sea ice, the polar bear is most intimately associated with the sea from which it derives its chief food—seals. It is found along the whole coast of Greenland, usually as more or less widely dispersed individuals or families; but on the southern part of the east coast and along most of the west coast it appears only as a more or less casual visitor. In winter and spring it comes with the pack ice down the southern east coast, around Cape Farewell, and up along the southern part of the Julianehaab District. It is least common on the west coast between Disko Bay and Julianehaab. Its chief haunts are the northern part of both the west and the east coasts. In the north, from about Polaris Bay to Independence Bay, it is rare.

In striking contrast to the poverty of the mammal fauna of the land, the seas about Greenland, teeming with pelagic plants, invertebrates, and fish, and not subject to the violent wave action of the Antarctic seas, support a greater variety of marine mammals than any other region of the world.

Six different kinds of seals are found in Greenland waters, the hooded seal, the Greenland seal, the ringed seal, the harbor seal, the bearded seal, and the walrus.

The hooded seal or bladdernose is more of a true sea mammal than

any of the other seals, living mainly far out to sea, among the great floes of drift ice in Davis Strait and off the east coast, approaching the land only twice a year. From April to June herds of hooded seals haunt the southern west coast from Holsteinborg to Julianehaab, being at this time fat and well fed. In June they disappear, returning in July in a lean state and remaining for only 3 or 4 weeks. Farther north, from Egedesminde to Upernivik, the bladdernose appears late in summer in rather small numbers, a few being caught as far north as Cape York. To the southern east coast (Angmagssalik) this seal generally comes from the north in April, but its numbers are few, and it disappears again in May. In July it reappears in greater numbers, this time from the south, remaining until well into the autumn. It is rarely seen on the coasts of northern east Greenland, and it does not occur at all on the north coast.

The Greenland seal or saddleback at some seasons lives far from land on the drift ice off the east coast and out in Davis Strait, at other seasons appearing along the coasts, most frequently in herds. On the southern portion of the west coast it appears in good condition in September, migrating from south to north between the islands; gradually it extends along the whole of the coast and into the fjords, keeping by preference to deep water. It is most numerous in October and November. In December its numbers decrease, and in February and March it disappears entirely, wandering away far from the coast to the drift ice where it brings forth its young. Farther to the north, particularly in the Egedesminde District, it remains until the ice forms, in mild years throughout the winter. In May, or farther north in June, the herds return in lean condition, followed by their young, usually hunting capelin. They remain along the coast until the latter part of July when, together with the capelin, they disappear, returning again in September. To the southern part of the east coast (the Angmagssalik District) this seal also migrates twice yearly, in July and September. In July both old and young appear, occurring individually until the ice begins to be solid. In September they appear in shoals, and then migrate toward the south. In Scoresby Sound the saddleback is only a casual visitor. This seal does not make breathing holes in the ice. When the icefields become extensive it resorts in herds to holes kept open by the currents. It disappears when the water is entirely covered by solid ice.

Commonest of all the seals on the Greenland coasts is the ringed or fjord seal—the "floe rat" of the sealers—which is found everywhere, even in the northernmost part of the island where no other seal occurs. It is usually seen singly, never in large herds, and remains more or less in the same locality throughout the year, frequenting especially the interior



of the fjords which cut deeply into the land, and preferring those that remain ice-covered for a long period. It scratches breathing holes in the ice, and frequently crawls out on the ice to rest. The young are born on the ice, from February to April, usually in a cave dug beneath the snow at the breathing hole made by the mother.

The harbor seal is a southern seal which on the west coast scarcely goes farther north than Upernivik, and on the east coast than Angmagssalik, though a few are said to have been seen in Scoresby Sound. It lives well dispersed, and is usually met with singly, or sometimes several together, but never in large herds. It remains throughout the year in the same areas, haunting the interior of fjords as well as the outer coast, avoiding the ice whenever possible and seeking isolated regions far from the settlements. It frequently crawls up on the rocks and beaches, sometimes also on the ice; but where the ice is solid it is seldom seen.

The bearded seal, the largest of the Greenland seals except the walrus, is less numerous than the other seals, and occurs usually as scattered individuals, not in large herds. By preference it keeps to the ice, though it occurs also near the shore and in the interior of bays. It seems to be most numerous off the southern west coast where it appears in spring with the pack ice, and also on the northern part of the west coast, especially around Nûgssuaq Peninsula. It still is found in the Thule District, and Robeson Channel seems to be its northern boundary. On the east coast it is of rather common occurrence throughout the year at Angmagssalik; it is not rare in Scoresby Sound and is met with even farther north. It seems to be absent from the region between Robeson Channel on the north coast and latitude  $77^{\circ}$  N. on the east coast.

The walrus is a permanent resident on the west coast only between Sukkertoppen and Egedesminde, particularly at the mouth of North Strømfjord where in the autumn it habitually appears in great numbers and hauls out on the islands around Taseralik, and also in the Upernivik District, Melville Bay, and Smith Sound. Elsewhere its occurrence is more sporadic. On the east coast it rarely appears in the southern portion, but in Scoresby Sound in the summer it is of relatively frequent occurrence along the coast; it also occurs farther north and has been observed as far north as Amdrup Land (lat.  $81^{\circ}10'$  N.). North of this point it has not been found, nor does it occur on that part of the north coast that faces the Polar Sea.

The whales known from the seas about Greenland number no less than 16—and 2 or 3 more probably occasionally stray into the region but have not been recorded. The 16 whales known from Greenland waters are the cachalot or sperm whale, the bottlenose, the narwhal, the

white whale, the caa'ing whale, the killer whale, the common porpoise, the white-beaked dolphin, Eschricht's dolphin, Holbøll's dolphin, the humpbacked whale, the blue whale, the finback or common rorqual, the piked whale, the Greenland whale or bowhead, and the North Atlantic right whale.

The white whale or beluga is a small whale usually about 12 feet long, though large males sometimes reach as much as 18 feet. The young when born are dark brown in color, but as they grow they become paler so that the adults are almost pure white. This is the commonest whale on the west coast of Greenland, though in the most southern portion it appears only sporadically and in small numbers. In summer it lives as far to the north as ice conditions permit, migrating southward in autumn. In Baffin Bay and in Smith Sound it appears in summer, and in Disko Bay it is common in October and November, remaining through the winter only in mild seasons. At Godthaab it appears at the beginning of December, and as a rule its migrations do not extend farther than somewhat south of Fiskenaes. Throughout the winter it keeps along the west coast about at the Arctic Circle, in April and May gradually working toward the north, so that when holes appear in the ice in May and June it is again numerous in Disko Bay, from which it disappears in July. During the migrations it frequently follows the coast, going in among the islands and into the fjords. At that time it usually appears in schools which may include as many as several hundred, or perhaps even a thousand.

When the winter ice is solid and without holes over large areas it is not found. But in the more northerly parts of Greenland it frequently happens, when severe cold suddenly sets in with calm weather, that a school of white whales becomes cut off from the open water by a broad belt of ice. In their distress they try to find a spot or a crack with open water, and if the cold continues they do all they can to keep the hole open. Such a school is called *savsat* by the natives. If the opening is small the whales sometimes lie close to each other. At other times they only come to the hole to breathe; they then usually have several holes in a long row over a distance of some miles along which they pass back and forth.

Little information is available regarding the occurrence of this whale on the east coast. At Angmagssalik it is occasionally seen and caught in July and August, and it has been observed at Scoresby Sound and at the mouth of Franz Joseph Fjord. However, it is common outside the ice belt of the east coast in the region about Spitzbergen.

The narwhal is a small whale about 12 feet long in which the male

has a single long, straight, sharply pointed tusk projecting through the upper lip and reaching 6 or 7, sometimes as much as 8, feet in length; rarely there are two tusks. Occasionally the female has a tusk, which is usually much smaller than that of the male. Though by no means so numerous as the white whale, the narwhal is common along the northern part of the west coast, but south of Sukkertoppen it appears only occasionally. In summer it is only found far north in Baffin Bay, in Smith Sound, and as far as Hall Basin. It does not migrate southward until late autumn. It does not appear off Ūmánaq until November, and as early as March it may be met with in Davis Strait, migrating toward the north. When the sea is suddenly covered with ice the narwhal resort in schools to some hole which they keep open by constantly moving about in it. If the hole is very small they do not leave it, but remain there with their tusks protruding through it. If they find no natural holes they may themselves break a hole or a row of holes through the ice by means of the thick and firm cushion on the upper side of the head in front of the blow hole. Such aggregations of narwhal, as in the case of the white whales, are called *savsat* by the Greenlanders.

The narwhal is also common along a great part of the east coast, where it seems to occur farther south in summer than on the west coast. It is rather common at Angmagssalik, as a rule appearing from May to August. Farther north and at Scoresby Sound it is rather common in summer, and it has been observed as far north as about latitude 75° N. Although it has not been seen living north of this point, remains of narwhals have been found in the ruins of former Eskimo habitations as far north as latitude 80°24' N. No trace of it has been found north of this point, or on the coast of Greenland facing the Polar Sea.

The familiar common porpoise, one of the smallest of the whales, only 5½ feet long, is a common summer visitor to the west coast of Greenland, from Cape Farewell to Upernivik, usually appearing at the end of April and disappearing in November. It occurs in schools among the outer islands as well as in the interior of fjords. On the east coast it is seen at Angmagssalik at intervals of several years, when there is very little ice.

The best known and most famous of the whalebone whales in the Greenland seas is the Greenland whale or bowhead. This whale reaches a length of about 60 feet, possibly as much as 67 feet, of which the enormous head makes up about one-third. The upper jaw is very strongly arched, so that the longest whalebone plates are about 12 feet long and from 10 to 12 inches wide at the base. This whale is the source of the finest grades of whalebone. Formerly it was common from Spitzbergen westward to Alaska, but it has been greatly reduced in numbers and



now is found only sparingly along the west side of Davis Strait and northward into Baffin Bay, locally farther westward, and in very small numbers in its former haunts off the west Greenland coasts.

When it was common it occurred along the west coast of Greenland from Smith Sound to Sukkertoppen, and as an occasional straggler farther south. It always kept close to the ice, frequenting by preference the margins of the great icefields. In the warmest season, in July and August, it lived far to the north in Baffin Bay and in the sounds between the islands of the Canadian Arctic Archipelago. In the autumn it migrated toward the south and east, one of its routes being along part of the west coast of Greenland. It appeared at Upernivik in October, and at Godhavn and Sukkertoppen in December. To Upernivik it came chiefly from the north, to Godhavn and the region farther south in all probability partly from the west, perhaps because its route of migration was deflected to the west of Disko, perhaps because it came partly from the west coast of Baffin Bay. From the more northerly part of the west coast, as the Upernivik region, it disappeared during the severest cold, from December on, but it returned and remained from April until July. At Godhavn and farther south it generally remained throughout the winter. It usually migrated from Sukkertoppen in March, and from Godhavn in June.

Off the east coast of Greenland it formerly occurred from about latitude  $80^{\circ}$  N., or even farther north, to about latitude  $65^{\circ}$  N., or somewhat farther south. In early summer it mostly kept to the sea between Greenland and Spitzbergen. In June and July when the belt of ice along the east coast became loosened and partly broken up it approached the coast, moving both to the north and to the south, off the Liverpool coast. In the autumn it seemed to roam southward along the coast near the shore. When the floes of drift ice offshore began to freeze together it migrated toward the margin of the ice belt and traveled for some distance both north and south. During the winter it probably frequented the margin of the ice off the more southerly part of the east coast, in the early spring again migrating toward the north along the ice margin, arriving at Spitzbergen in April.

For the most part it lives in small schools, by preference where the sea is covered by icefields divided by channels of open water, and is more rarely seen in the open sea. It likes to stay beneath the ice.

In the seas east of Greenland the Europeans began to hunt the bowhead in 1611, and along the Greenland coast of Davis Strait in 1719. At the height of the fishery the number annually killed east of Greenland

might amount to 2,000 a year, in Davis Strait to several hundred. The killing of this whale is now forbidden by international agreement.

The humpbacked whale, from 40 to 50 feet long, is common along the west coast of Greenland, at least along the stretch from Frederikshaab to Disko, occurring individually or in small schools. It is a summer visitor, appearing at the end of April and disappearing in November. On the east coast it is seen at Angmagssalik at long intervals when the pack ice has disappeared.

The killer whale, the most ferocious and formidable animal in the Greenland seas, reaches in the males a length of 31 feet, with an immense dorsal fin  $5\frac{1}{2}$  feet high; the females are scarcely half as large, reaching a length of 16 feet. It is rather common in small schools along the shores of the sea west of Greenland from Frederikshaab as far as Upernivik, and is also known from Cape York. On the east coast it has been met with a few times at Angmagssalik, and once in the outer part of Scoresby Sound. The killer occurs in all seas, and is occasionally seen off our coasts. It feeds chiefly on seals and also on porpoises, and sometimes attacks the large whales.

The caa'ing whale—the "blackfish" of the New England coast—is from 20 to 28 feet long. It is in Greenland, as elsewhere, of irregular occurrence, occasionally appearing in large schools on the southwestern coast.

The sperm whale or cachalot, the largest of the toothed whales, is a summer visitor to Davis Strait, usually keeping well out to sea. The male is 60 feet in length, but the female is much smaller, only 35 feet long. The bottlenose, the male of which is 30 feet long and the female 24, occurs offshore beyond the drift ice, chiefly in the seas east of Greenland. Both these whales feed on cuttlefish, in pursuit of which the sperm whale is known to dive to a depth of a mile beneath the surface.

The blue whale, largest of all animals, reaching a length of 100 feet or even more, and the finback, up to 80 feet long, are common in summer in the seas about Greenland. The small piked whale, 33 feet long, is of frequent occurrence in the summer, usually in pairs or singly, along the west coast at least as far as Upernivik, and also on the east coast after the ice has gone. It is most numerous in the south and occurs in the interior of fjords as well as farther out.

The white-beaked dolphin and Eschricht's dolphin have each been met with a few times in Davis Strait on the Greenland coast. Holbøll's dolphin and the North Atlantic right whale, which is about 60 feet long and resembles the bowhead except that the head is less arched, have both been recorded once from western Greenland.

Before the coming of the Europeans the native Eskimo had only a

single domestic animal, the dog. In northern Greenland the dog is still indispensable, especially for winter hunting. South of the Holstenborg District there is no sledging, and here dogs are kept only as pets and for the sake of their skins.

In some of the communities in the Julianehaab District there is cattle and sheep raising. In order to encourage sheep raising, for which conditions in this district are fairly good, the Government in 1915 established a fairly large sheep-raising station at the Julianehaab settlement. From this station the Greenlanders who desire to go in for this occupation are supplied with breeding animals, and the station also buys the products and ships them to Denmark. The station also has at its disposal a few Icelandic horses, the only ones in Greenland.

Goats are kept throughout southern Greenland, principally for their milk, though partly for their meat.

Attempts have been made at keeping rabbits. They do well, but there is little interest in them.

*Birds.*—Conditions in Greenland do not favor diversification in the land birds. Between the inland ice and the sea there is only a narrow mountainous coast, without woods. Here and there sparse growths of willow, alder, and juniper may be seen, and in the south birch, but for the most part the country is covered with low vegetation of various types, interspersed with more or less extensive areas of naked rock. Whereas the land mammals of Greenland are all of American types, the land birds, including those aquatic birds that breed away from the coasts, while mostly circumpolar, include European as well as American elements.

By far the greater part of the bird life of Greenland is associated with the sea or, like the geese, ducks, and waders, is aquatic. The number of different kinds of sea birds, however, is much less than it is in the Bering Sea area. This is parallel with the lesser diversity in the fishes and in the marine invertebrates.

There are 172 different kinds of birds recorded from Greenland of which no less than 107 are casual or accidental visitors; one, the European whooping swan, is no longer found in Greenland, and one, the great auk, formerly a casual visitor, is extinct. Of the casual visitors, 60 percent are from North America, 36 percent are from Europe, and the remainder are found both in Europe and in North America.

Of the 55 birds that are definitely known to breed in Greenland, slightly less than half remain throughout the year, the others migrating southward in winter.

Of the permanent residents only 10 are land birds. These are two



PLATE 18

Left: Monument to Rear Admiral Robert E. Peary at Cape York, 1,600 feet above sea level. Photograph by Capt. R. A. Bartlett.

Right: Two Greenlanders in the doorway of the ruins of the church built at Kakortok Harbor by Eiríkr Thorvaldsson's (the Red's) colony before the fourteenth century. Photograph by Richard L. Davies.

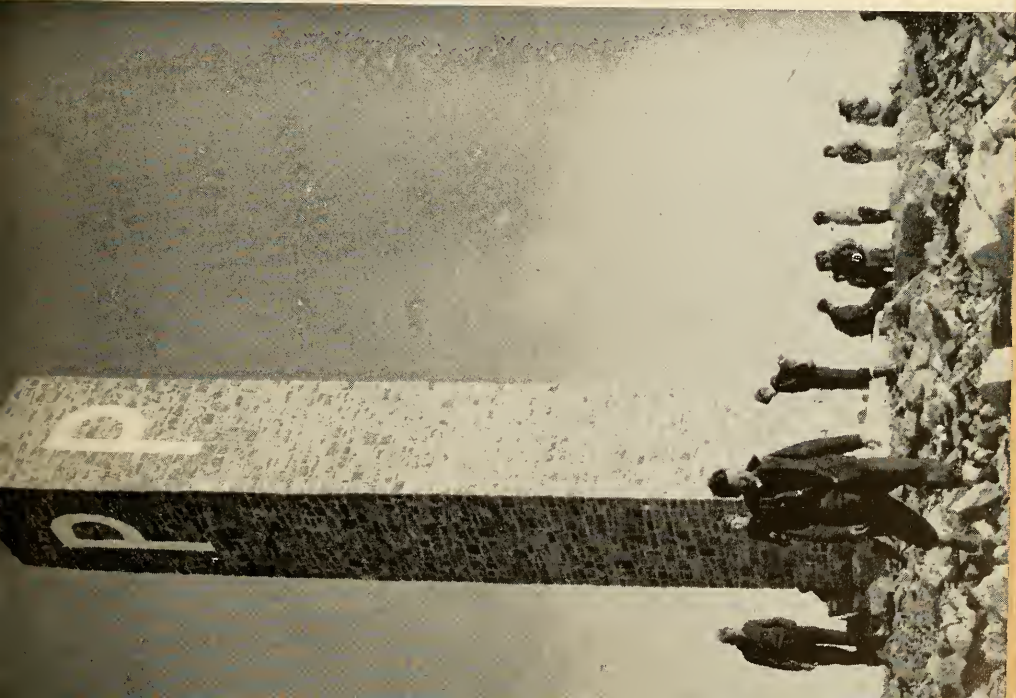






PLATE 19

Upper: Holsteinborg, Greenland, in 1932. Photograph by Capt. R. A. Bartlett.

Lower: The town of Julianehaab, with the church in the foreground. All the churches in Greenland are Danish Lutheran. Photograph by Richard L. Davies.







PLATE 20

Upper: The town of Ivigtût, Ivigtût Fjord, Greenland, the locality of the famous cryolite mine. Mount Kunjat in the background. Photograph by Richard L. Davies.

Lower: Angmagssalik, Greenland, the largest town on Greenland's east coast. Photograph by Capt. R. A. Bartlett.







PLATE 21

Upper: Greenland girls dressed in native costume.

Lower: Herd of walrus on the ice off the coast of Greenland.

Photographs by Capt. R. A. Bartlett.



forms of the rock ptarmigan, one in the north and one in the southwest; the snowy owl; the gyrfalcon (with a gray and a white phase); the white-tailed eagle; the raven; Hornemann's redpoll; the mealy redpoll; and the snow bunting. Although all these are permanent residents, all move southward to a greater or lesser extent during the dark season. The snow buntings and redpolls are said to migrate toward the interior, while the others move toward the coasts. In the case of the snow bunting the migration toward the interior chiefly concerns the old birds, the young being supposed to migrate southward across the sea.

During the summer months these permanent residents are joined by the Greenland wheatear, the American pipit, and the Lapland longspur.

The resident birds other than land birds include 1 wader, the purple sandpiper; 7 ducks; 1 cormorant; 4 gulls; 2 murres; and the little auk or dovekie. Of these the most interesting is the Greenland variety of the mallard, the only duck confined to Greenland. All the other birds mentioned are more or less widely distributed, and all are known from New England, some from much farther south.

The 29 birds that breed in Greenland but leave the country in winter include the white-fronted, pink-footed, snow, brant, and barnacle geese; the common and red-breasted loons; the fulmar petrel; the peregrine falcon or duck hawk; the ringed plover; the turnstone; the red-backed sandpiper or dunlin; the sanderling; the red-necked and gray phalaropes; Sabine's gull; the kittiwake; the Arctic tern; the common, long-tailed, and pomarine jaegers; the razor-billed auk; and the common and large-billed puffins.

Domestic fowl are kept by the Danes everywhere in south Greenland, and in the north at the settlements about Disko Bay and in the Æmánaq District.

*Fishes.*—Including those from deep water, 100 different kinds of fishes are known from the seas about Greenland. At about the latitude of the Arctic Circle a submarine ridge extends from Baffin Land to west Greenland, and another from east Greenland to Iceland and beyond. South of these ridges the abyssal fishes are those of the Atlantic deeps. North of them, in water the temperature of which is about 32° F. or somewhat lower, are found the fishes of the cold deeps of the Greenland Sea. In the shallow water on the east coast a number of important fishes do not range farther north than Angmagssalik, on the south side of the ridge. On the west coast there is a much less definite line of demarcation in the general vicinity of Disko Bay.

Only three fishes are found in the fresh waters of Greenland, all of them living also in the sea. These are the northern trout or charr, the



three-spined stickleback, and the American eel. There are two varieties of the charr. One lives permanently in ponds and streams and reaches only about 6 inches in length. The other lives in the sea and ascends the streams to spawn, like the salmon; it reaches 30 inches in length. Very large ones in the larger rivers are usually called salmon.

*Land invertebrates.*—There are 437 different kinds of insects known from Greenland of which 188, or about 40 percent, are two-winged flies, including the pestiferous Greenland mosquito and two buffalo gnats or black flies, one of which is as annoying as the mosquito. There are five kinds of butterflies of which two, a medium-sized brilliant orange one and a smaller brown bog fritillary, are widely distributed and common, while the other three, the Arctic copper (a close relative of the European copper), the Arctic blue, and another bog fritillary, are very local. These butterflies all pass the winter as caterpillars, and are assumed to require 2 years to develop from the egg to the butterfly. There are 44 kinds of moths, all of them small, though some are very handsome. There are 66 hymenopterous or wasplike insects, all, except for a few sawflies and two bumblebees, parasitic, chiefly on flies. The spiders and their relatives number 124. Of the spiders the commonest are hunting spiders.

According to Hendricksen and Lundbeck the greater part of the insects and spiders are purely European forms so that, in spite of its geographical position, Greenland, on the strength of its land arthropod fauna, belongs to Europe. All the butterflies occur in North America as well as in Europe.

*Marine invertebrates.*—There are about 742 different kinds of crustaceans in the seas about Greenland, and 60 in the fresh waters. Some of the smaller kinds, which often swarm in the sea in unbelievable numbers, together with certain pelagic mollusks, are very important as food for whales. There are 247 different sorts of marine mollusks known from the seas about Greenland.

Nearly all the other invertebrate groups are well represented in the Greenland region, the individuals of many, if not most, of the species being enormously abundant. In shallow water in many places the sea bottom for several miles is entirely covered with the common Arctic sea urchin, well known to all visitors to the New England coast. This is not eaten in Greenland although it is, or has been, a most important item in the dietary of the Aleutian Island people.

Several of the marine invertebrates occurring in the seas about Greenland are of unusual size. The giant squid, which reaches a total length of 55 feet with the body from the tip of the tail to the base of the arms 20 feet long, the largest invertebrate known, has been found washed ashore. It was presumably one of these giant squid that was seen by



Hans Egede on July 6, 1734, and recorded in the journal of the Greenland Mission as a sea serpent. The common Arctic jellyfish reaches a diameter of  $7\frac{1}{2}$  feet with tentacles 125 feet long, though these figures are taken from one washed ashore near Boston. The common Arctic featherstar, found all along the Greenland coasts in water of moderate depth, is one of the largest of the group with an expanse of nearly 2 feet.

As in the case of the fishes, the Atlantic deep-sea types extend northward to the ridges across Baffin Bay at about the Arctic Circle and from east Greenland to Iceland; north of these ridges occur the bottom animals of the cold depths of the Greenland Sea.

#### SIGNIFICANCE TO THE NATIVES OF THE ANIMAL LIFE

By far the most important animals, so far as the Greenlanders are concerned, are the seals. The ringed seal is eagerly sought, and in the northern settlements it is the chief objective of the chase. Because of its curiosity, which often induces it to come within range, it is the easiest to shoot of all the seals. The Greenland seal is also extensively hunted. It is killed in large numbers, particularly off the southern part of the west coast. The skin is especially suitable for clothing, waterproof skins, dyed skins, and skins for shoe soles and kayaks. In the Thule District the walrus is of great importance—indeed it is the most important of all the animals that are hunted. It is also of considerable importance at the recently established settlement at Scoresby Sound on the east coast. Elsewhere it is of no great significance. The hooded seal is of great importance to the population of the Julianehaab District and in part of the Frederikshaab District, where it is killed in large numbers among the floes of sea ice. In the northern districts it is caught in appreciable numbers only among the outer islands. The bearded seal is especially valuable because of its thick skin which is cut into strips and used for towing lines as well as for lashings on kayaks, umiaqs, and sledges. It is also used for covering umiaqs. The skin of the harbor seal is finer than that of the other seals, and is therefore in special demand by the women for their gala attire. In recent years the hunting of this seal has greatly decreased.

Most important of the whales from the Greenlanders' point of view are the white whale, the narwhal, and the common porpoise. A few of the large whales are captured each year, but the killing of the scarce bowhead or Greenland whale has been stopped by international agreement.

On the west coast the white whale is sometimes hunted from kayaks with harpoons or rifles, though chiefly by means of nets. A special form

of hunting is carried on at a *savsat*, where it is possible to kill several hundred white whales in a few days. In some places the hunting has improved greatly in recent years; by means of motor boats, the noise of which frightens them, they are driven in schools into indentations along the coast from which escape is impossible. Besides the meat and blubber, the skin of this whale is valuable, as it can be made into leather. The skin of this, as well as of other whales, is called *mátaq* and is considered a special delicacy. It is eaten raw as well as boiled or fried, and is an excellent remedy for scurvy.

Though not so numerous as the white whale, the narwhal is of much importance to the Eskimo, especially in the north. They are sometimes able to kill several hundreds at a *savsat* in a short time. It is also frequently captured on the east coast.

The porpoise is hunted like seals from kayaks or killed with rifles.

A number of large whales are now caught on the west coast, and the hunting of these whales is of great importance to the population in the settlements.

The larger whales, especially the bowhead and the humpback, in former times were occasionally captured by the Greenlanders. At Frederikshaab the natives used to have a special technique for killing the humpback. In boats propelled by paddles they cautiously approached it while it was asleep and thrust three lances into the region of its heart, then pursued it until it died, when they drove a harpoon into it and towed it ashore. This form of hunting whales has now disappeared.

The *caa'ing* whale is hunted whenever it appears. For instance in 1926 some 200 were killed at Sukkertoppen in the middle of September.

Most important of the land mammals for the Greenlanders are the reindeer or Greenland caribou. The meat is eaten, the fat is used for various purposes, for instance as cream in coffee, and the contents of the stomach are considered a special delicacy. The skins are used as underlayers on sleeping platforms and for sleeping bags and garments, the antlers for hunting implements, the sinews for thread, etc. The reindeer hunters with their households set out in *umiaks* at the end of June and, entering the fjords, go to the great plateaus in the neighborhood of the inland ice. They pitch their tents in the selected summer camp, which the hunters use as a base. They generally return to their settlements on the outer coast in the latter part of August or at the beginning of September. Although the profits are relatively small, reindeer hunting is still popular because open-air life is considered by the Greenlanders one of their greatest pleasures. In north Greenland reindeer

hunting is carried on chiefly in the winter. The killing of reindeer is now subject to strict governmental regulation.

The polar bear is of great importance to the Greenlanders in the Thule District. Its skin is absolutely indispensable to the Polar Eskimo for trousers, for without this warm clothing it would be impossible for them to hunt throughout the winter, and bear skins are better than anything else as rugs for sleeping platforms. In the rest of Greenland bear hunting is of importance only in three districts, Angmagssalik, where about 100 are killed annually; Julianehaab, with an annual catch of about 32; and Upernivik, with an annual catch of about 17. In the new settlement at Scoresby Sound 115 bears were killed during the first year.

Fox skins are used for overjackets and trousers for the women, and in the winter when the animals are fat the meat is much prized. Foxes are caught in traps set along the beaches and baited with bits of fish or blubber; more rarely they are killed with rifles. In the settled areas fox hunting is regulated by law. In 1913 a farm for breeding foxes was established at Godthaab.

The Arctic hare is not of any great importance. The Greenlanders as a rule do not like its meat, but occasionally shoot it to sell to Europeans. In the Thule District it is caught in snares which are set and tended by the women and children. The skins are used for stockings. In south Greenland the shooting of this animal is forbidden during the summer.

Economically the most important bird in Greenland is the eider duck. This duck breeds everywhere on the west coast—rarely in the south, abundantly in the north. For breeding places it chooses by preference low islands. Most of the eiders pass the winter in south Greenland, in the evening passing to the interior of the fjords, in the morning returning to the outer shore. In April and May they migrate northward in huge flocks. The eider is hunted at all seasons. The flesh and eggs are eaten, the skin is used for clothing or sewed into eider rugs, and the down is sold. Hunting the eider and collecting the eggs and down are now under strict government regulation.

The king eider, which breeds along the northern part of the west coast and also rather commonly in the northeast and winters in south Greenland, is also caught in great quantities.

Brünnich's murre is perhaps the commonest of Greenland birds, and is of great importance to the population. It keeps mostly out to sea and only rarely enters the fjords. It breeds in flocks, sometimes in immense numbers, on the ledges of steep cliffs, either by itself or in company with other birds—fulmars, cormorants, gulls, or auks. There are great numbers of these rookeries, especially in the north, the largest being Qaersorssuaq



(or Sanderson's Hope) at Upernivik. This is 3 miles in length, one of the highest in Greenland, and is covered with nests as far as the eye can see. This bird does not breed in south Greenland, though it is found here in great flocks in summer. In times of severe cold or heavy snow it comes inshore in great numbers and takes refuge in the fjords which are most free of ice, especially in the Julianehaab and Godthaab Districts. Here it is caught with bird darts, not only by the regular hunters, but by all who are able to paddle a kayak, from old men to boys of 10 or 12, or is killed with small shot. In a few places the hunting is done by several kayaks surrounding a large flock, driving them into a narrow bay, and then gradually up onto the land, where it is possible to catch them by hand as they cannot rise from land. When the fjords freeze over, the birds are shot at holes, and when these freeze, they are caught by hand, as they cannot rise from ice. At the rookeries great quantities are shot, and the people in the vicinity more or less live on them throughout the summer. Besides eating the flesh, the Greenlanders use the skins with the down attached for clothing, while the feathers are collected for feather beds, or for sale.

The little auk breeds commonly on the northern part of the west coast—by millions on all the cliffs at Cape York. It is very important as a supplement to the usual winter food, and its small skins are used for making undergarments.

The black guillemot is a common breeding bird on all the Greenland coasts, except in the north where there is no open water in summer. Unless temporarily driven away by ice, it is a permanent resident. It is less valuable than Brünnich's murre, and not so abundant.

The various kinds of sea gulls are shot at the cliffs, and also during their migrations. Puffins, jaegers, skuas, ducks, geese, cormorants, and loons are occasionally hunted. Of all these the cormorant is the favorite. The flesh, particularly of young birds, is a favorite dish, and the skins are in great demand. It is, however, now becoming scarce.

The only land bird of economic importance is the ptarmigan which occurs everywhere, even on the north coast facing the Polar Sea, on the outlying islands, and inland as far as the inland ice. It is very variable in its occurrence in any one locality. Professional native hunters take little interest in the ptarmigan, which are killed almost exclusively by half-grown boys, by people who cannot go out in kayaks, and by Europeans. The Greenlanders do not eat ptarmigan when other food is available, so the birds killed are sold to the Danes. The taking of ptarmigan is now regulated by law.

Perhaps the most important fish in Greenland is the capelin, a relative of the smelt. In the region from Disko southward the capelin come inshore in immense shoals every year in May, June, or July, to spawn in the fjords in places where the beach is shelving and sandy, or at least more or less level. Each hamlet, as a rule, has a special place to which the people, including the women and children, go at the proper season for the capelin fishery. At certain hours when the fish are closely packed along the shore they are scooped up in pails or dip-nets and spread out on the rocks to dry. Large quantities are boiled and eaten on the spot, while those spread on the rocks are gathered in sacks or strung to be kept as reserve food for winter use. In the northern settlements where dogs are of great importance for traveling and for winter hunting dried capelin form a significant item of their food.

Another important fish is the Greenland shark which is widely distributed in west Greenland from Cape Farewell to Wolstenholme Fjord, and in east Greenland is very common at Angmagssalik, and occurs in Scoresby Sound. It lives in the fjords as well as far out at sea. It is usually between 8 and 13 feet in length, reaching a maximum of about 18 feet. In winter it is caught through holes in the solid ice, in summer from kayaks and small wooden boats. In north Greenland where dogs are extensively used for hauling sledges, this shark is of much importance in providing food for them. When fresh the flesh is poisonous, causing "shark intoxication," but when dry, or after being boiled in several changes of water, it is excellent food. The most valuable product from this shark is the oil extracted from its liver. Most of this is exported, though some is used locally as lamp oil. In recent years about 35,000 sharks have been caught annually, in some years as many as 50,000.

Other Greenland fishes of importance to the inhabitants are the cod, which fluctuates greatly in numbers; the halibut; the Greenland halibut; and the large form of the charr, of which the flesh varies from white to red; all these are exported. Fishes used more or less extensively locally as food but are not exported are the fjord cod; the Norway haddock—the "rosefish" of New England; several kinds of sculpins; the lump-sucker, the eggs of which are regarded as a special delicacy; the long rough dab; the sea cats or sea wolves; and the polar cod.

Of the invertebrates the red deep-sea prawn and the Greenland crab, which reaches an expanse of more than 30 inches between the tips of its claws, are the most important as human food. The large scallop is considered a great delicacy by the Europeans, and the common mussel is eaten by the natives.

## FLORA

The flora of the Arctic has a charm that is peculiarly its own. There are no very striking plants, and none of the plants have large flowers. But this is counterbalanced by the effect of the short growing season with very long days, which causes most of the plants to produce all their flowers almost simultaneously, and all the different kinds to blossom at about the same time. So wherever there is enough soil to support a luxurious vegetation the myriad flowers of the Arctic produce an impression never to be forgotten.

Among the more conspicuous and more familiar flowers in Greenland are the buttercups, poppies, saxifrage, dandelions, pinks, bluebells, rhododendron, milfoil, potentillas, fleabane, lousewort, and twinflowers. One of the interesting plants in Greenland, as elsewhere in the far north, is the quon or *Archangelica*, a large umbelliferous plant which may attain a height of 7 feet with shoots the thickness of an arm. It is common in the south, and in the Disko region in the vicinity of the hot springs. It is considered a great delicacy by the Greenlanders.

Exclusive of those that have been introduced, there are known from Greenland 390 different kinds of flowering plants and ferns, 600 mosses, 300 lichens, 185 marine algae, 375 fresh-water algae, 600 marine and fresh-water diatoms, and 45 marine and fresh-water dinoflagellates. These figures can be considered as approximately correct only for the flowering plants, ferns, and mosses, as much still remains to be learned about the plants of the other groups.

Prof. C. H. Ostenfeld believes that some plants, at least, lived in Greenland during the Ice Age, for it is probable that even during the maximum extension of the inland ice there were nunataqs, rocky walls, ledges, etc., free of ice, and where conditions were favorable these would have been able to support a few hardy plants. No less than eight different kinds of plants were found on a nunataq area near the northern coast, in about latitude 81° N., and no less than 54 species have been found on three nunataqs situated some distance from the coast in southern west Greenland.

The number of kinds of plants decreases from the south northward, and as a result of the fact that there is more ice-free land in the west than in the east, and conditions here are generally more favorable for plant life, 134 species are known from the west coast that do not occur on the east coast; but 46 of these were introduced at the time of the old Icelandic settlements. On the east coast there are nine plants not known from the west coast.



There are eight floral zones in Greenland of which the most southern and richest includes only the southern tip south of Ivigtût, and the most northern and poorest includes the extreme north, north of latitude  $81^{\circ}$  N. Northern Greenland is the extreme northern limit of plant growth.

Of the plants at present living in Greenland, 52 percent do not give any indication of their origin, but presumably came from adjacent America; 29 percent are American; and 19 percent are European, but two-thirds of these are introduced. The affinities of the flora of Greenland are therefore very definitely American.

Shrubs, tall or of medium height, and in some places small trees, are found here and there in Greenland, singly or in copses, as far north as Orpik (lat.  $72^{\circ}30'$  N.) in the west, and Scoresby Sound in the east. The finest copses are in the interior fjord valleys of the Julianehaab District. These consist of large-leaved birches, which may be as much as 20 feet in height, frequently interspersed with willow, alder, mountain-ash, or juniper.

The lowest copses are composed of dwarf birches, attaining a height of about a yard. The alder, growing to a height of from 3 to 7 feet, is found singly or in small groups, or in willow or birch copses. Willow copses may be as much as 10 feet in height. Even as far north as the south side of Disko there are fairly large copses, particularly in the valleys, the shrubs reaching nearly 7 feet in height.

The prettiest tree in Greenland is the American mountain-ash, which here grows into a straight little tree with a height of 8 or even nearly 12 feet.

Of the lower plants in Greenland the most interesting is the minute, almost microscopic alga which, living in immense numbers to a depth of several inches in the snow, gives it a pink or even a fairly bright red color. Long ago Sir John Ross mentioned the occurrence of red snow in the otherwise shining white desert, and pictured snowfields in north Greenland which he called "crimson cliffs." Less common is the green snow, the color of which is caused by a related plant.

#### THE NATIVE INHABITANTS OF GREENLAND

The first Icelanders to settle in Greenland under the leadership of Eiríkr found traces of human dwellings in various places, but they saw no natives. The first record of what were probably Eskimo is given in an account of a shipwrecked party high up on the east coast. In 1003 Thorgils Orrabeinfostre "was along on the ice and he found a big sea

animal driven up into an opening in the ice and two witches stood beside it tying bundles of meat together."

In the early years of the thirteenth century there are more definite records. "On the other side of the northern Greenlanders [i.e., Icelandic colonists], hunters have found some small folk whom they call *Skrællings*. . . . They are altogether in want of iron, using walrus teeth as arrows and pointed stones as knives."

At that time therefore, the Eskimo lived not in the section of west Greenland inhabited by the Icelanders, but considerably farther north. Even as late as 1265 they still lived far to the north. But by the middle of the fourteenth century they had begun to appear in the northern settlements, and in the last half of the century they came into contact with the western settlements, which soon succumbed to them. Later they may have overrun the "eastern" (geographically southwestern) settlements; at any rate, all traces of the Icelanders disappeared.

On the rediscovery of Greenland by Pining and Pothorst in 1472 or 1473 the expedition was attacked by the Greenland "pirates" in many small boats without keels. This was in the region of *Angmagssalik*, on the east coast opposite *Snæfelljökull* in Iceland. John Davis on his voyages in 1586-1587 and 1588 landed on various parts of the west coast where he found and traded with natives, of whom he gave a sympathetic account. Nearly all subsequent explorers who visited Greenland seem to have found natives, so it is evident that they had reoccupied the areas which had been abandoned at the time of the first colonization by the Icelanders.

The Greenland natives are the easternmost group of the Eskimo, a distinctive race of Mongoloid affinities, showing some points of resemblance with certain Indians, that inhabits the far northern regions from eastern Greenland across the extreme north of North America to Alaska and northeastern Asia. There are about the same number of Eskimo in Greenland and in Alaska, which together have about five times as many as the entire remaining sparsely settled area inhabited by them.

As far as the Eskimo are concerned, the decisive cultural factors are the conditions surrounding the capture of sea mammals. It is important to remember that the animal kingdom furnishes almost the entire support of the Eskimo. Indeed, they can get along perfectly well with no vegetable products whatever. From animals they get practically all their food and clothing, tent and boat coverings, blankets for sleeping platforms and sledges, ropes, thongs, and thread; they fashion their implements from bone, ivory, and baleen, sometimes from stone, and they use blubber

and oil for fuel. Driftwood is by far their most important vegetable product, though heather and peat may be used for fuel.

Considering the Eskimo as a whole, their maximum cultural development is in the Bering Sea region. Although the least developed culture is not found in Greenland, still the original Greenland cultures are in certain respects more or less primitive from the Alaskan point of view.

The Eskimo entered Greenland from North Devon and Ellesmere Land, coming in successive small groups at irregular intervals. The last group entered the Thule District between 1862 and 1866. It is not yet certain what route they followed in their migrations around the Greenland coasts. One view is that they went south along the west coast, around Cape Farewell, and then north along the east coast. Another is that some, at least, traveled along the north coast and then south along the east coast. Favoring the latter hypothesis is the similarity between certain archeological remains on the northeast and northern part of the west coasts, though this may be explained in other ways.

In discussing the Eskimo population of Greenland at the present day, Dr. Kaj Birket-Smith points out that the region north of Etah and bordering the channels that lead to the Polar Sea is the section closest to the outer world, and presumably lies in the path by which the Eskimo entered Greenland. On Inglefield Gulf, between Etah and Humboldt Glacier, nine old dwellings have been located at Rensselaer Harbor, Marshall Bay, and Advance Bay. In the neighborhood of Marshall Bay there are no less than 60 house ruins, and even now Eskimo sometimes winter on this coast. North of Humboldt Glacier there are deserted dwelling places at Camp Clay and Camp Webster. Those at the latter place are the most northerly ruins of houses known in west Greenland—5 large winter houses, 7 tent rings, 17 meat caches, and 1 grave. The most northerly traces of Eskimo are at Polaris Bay, where there are seven tent rings and a fireplace.

The central part of the Thule District, the coast between Etah and Cape York, is at present the most northerly inhabited region of the world. The people living here, the so-called Polar Eskimo, are a small tribe (numbering 251 in 1922), but their hunting grounds cover immense areas, from Humboldt Glacier and even farther north to Cape Holm in Melville Bay. Formerly they used to cross over to Ellesmere Land to hunt musk ox, but this has been stopped. Since the reindeer have now become rather scarce, these people largely hunt bears. Numerous ruins show that this region has been inhabited for a very long time. Melville Bay, on the southwestern border of the area, was evidently once densely populated.



The repopulation of west Greenland took place after the establishment of the Icelandic colony there. The whole west coast is now inhabited from Igdluligssuaq, south of Holm Island, southward.

The southeastern coast is no longer inhabited. Capt. W. A. Graah estimated that there were about 600 natives here in 1829-30, but even then they had begun to leave for the mission posts on the west coast. In 1884 Gustav Holm found only 135 here, and they were still leaving for the west coast. After the establishment of a trading post in 1894 at Angmagssalik, where there was already a considerable Eskimo population (now about 800), some of the natives went there. The last 38 left Tingmiarmiut in 1899 and in the summer of 1900 arrived on the west coast. One family of eight members remained, but later left for Angmagssalik.

After the depopulation of the southeastern coast, probably largely induced by the reduction in the numbers of the seals through wholesale slaughter by European sealers, the Angmagssalik District was the only inhabited region on the east coast until the establishment of the new settlement in Scoresby Sound by the transfer of 70 Eskimo from Angmagssalik in 1925.

On the north coast between Polaris Bay and Brønlund Fjord a meat cache has been found at Frankfield Bay, slightly to the west of St. George Fjord, which shows that hunters have penetrated to this region. Dr. Birket-Smith says it is remarkable that no other traces of Eskimo have been found, for it is certain that if the Eskimo migrated to the east coast by way of the north they must have wintered here. He suggests that they may have lived exclusively in snow huts, like the central Eskimo tribes of Canada.

As described by Dr. Birket-Smith, the Polar Eskimo, the most northerly people of the world and the only ones living under extreme Arctic conditions, have a high Arctic culture which centers entirely around ice hunting. This high Arctic culture is found in the Thule District where the occurrence of fjord seal and walrus, and to a certain extent bearded seal and bear, determine the location of the dwelling places. Where the ice lies smooth and unbroken without being pressed into ridges and hummocky fields the seals have their breathing holes, and in spring they creep up on the ice in order to bask in the sun. The walrus is to be found under young ice which it can break with its hard and solid skull, and in Melville Bay the bear wanders regularly between the open water and the glacier. A smooth floe which offers the best conditions for sledging is essential for the site of a dwelling place. A necessary

condition for the existence of a high Arctic culture is that ice floes remain practically throughout the year, so that the kayak is not necessary; but at the same time there must be an alternative to resort to when the hunt for sea mammals fails. Dr. Birket-Smith says that this is the case in the Thule District. Along the north coast of Greenland the sea is never entirely free of ice, but is covered with the so-called paleocrystic or permanent ice, or in the fjords with permanent sikûssaq ice, which is very unfavorable for mammals. It is possible that an Eskimo population in these regions would have to depend on musk ox hunting to a very large extent. It is doubtful whether even the Eskimo could exist along the north coast of Peary Land where steep mountains covered with ice and destitute of hunting grounds drop down to the permanently frozen ocean.

Arctic culture requires, in winter, lasting and smooth floe ice on which the hunter can look for the breathing holes of the seals. This culture type is not sharply differentiated from the preceding. The fjord seal is still the chief game, and the requisites for dwelling places are in several respects the same. The occurrence of other animals, as walrus and bearded seal at Nûgssuaq, and bear in the direction of Melville Bay, only exceptionally influence the location of the dwelling places. Open water in winter here begins to be a factor to be taken into account. This occurs partly in icefjords where the motion of the glacier produces open leads in the ice, and partly at tidal rapids where the tide keeps large holes open. Around such open waters the seals gather.

A transition stage between the Arctic and sub-Arctic types is seen in the habitations in the Egedesminde and Holsteinborg Districts. Here the fjord seal still plays a part, though a far less important part than farther north, and the saddleback now, perhaps, ranks first as the chief objective of the hunt. For this reason the inhabitants shun the long and narrow fjords and keep to the island belt where the saddlebacks pass. Now that the fjord seals have greatly decreased in number, the natives in the fjords of Holsteinborg are in winter mostly restricted to fishing for Norway haddock and fjord cod.

The sub-Arctic culture is characterized especially by kayak hunting, accompanied by the disappearance of the dog sledge, which is not found farther south than Holsteinborg, and by cod fishing. The sub-Arctic culture area proper corresponds very nearly to the west coast from the Arctic Circle south to Cape Farewell, the culture reaching its climax on the southern west coast. When, in addition to favorable conditions for kayak hunting, there is a special abundance of seals the cultural possibilities are developed

to the maximum, as was originally the case at Julianehaab Bay, to which great quantities of bladdernose were carried by the pack ice around Cape Farewell from the east coast.

But there is no sharp dividing line between these cultures. North of the Arctic Circle the area as far as Disko Bay forms a transition to the Arctic phase, and on the east coast there is a similar transitional region on the King Frederick VI coast and in the area about Angmagssalik. Some of the most expert kayakers live on the small group of islands at the entrance to Disko Bay, and also at Angmagssalik, and in both regions there is also dog sledging.

By far the greater number of Eskimo live on the west coast south of Disko Bay, and along the greater part of this coast the kayak can be used, with short interruptions, throughout the year. Here also seals are especially abundant.

Linguistically the dialects of the language of the Greenland Eskimo are phonetically related, and are distinguished from other Eskimo dialects by certain common characteristics. In their culture the Greenland Eskimo, especially beyond the Thule District, also show a very few endemic characteristics.

The present native peoples of Greenland are properly referred to as Greenlanders, not as Eskimo, for they have advanced far beyond the primitive stage usually associated with the term Eskimo. They number at present about 18,000. They have increased steadily during the past 40 years. In 1901 there were 11,600; in 1911, 13,000; in 1921, 14,000; and in 1931, 16,800. They are more or less extensively mixed with European blood, chiefly Danish. The greatest mixture is about Disko Bay, where it would now be difficult to find a native of strictly pure blood. Mixed-bloods are decidedly in the majority all along the easily accessible west coast. In the isolated Julianehaab region, in the southern part of the Egedesminde District, and in the Upernivik District mixed-bloods are at a minimum.

#### HISTORY

The early history of Greenland from the year 900 to the year 1492 is the history of an Icelandic colony that finally perished and was all but forgotten. This colony is memorable because it was from Icelandic Greenland that the North American mainland or "Vínland" was discovered in the year 1000, and its settlement attempted.

The history of this colony has no connection with the rediscovery of Greenland which led to its permanent settlement, but is properly speaking an integral and interesting part of the history of Iceland.



The rediscovery of Greenland leading to its colonization by the Danes was one of the results of the attempt to find a route to China by sea through a northwest passage. Strongly encouraged by King Alfonso of Portugal, King Christian I of Denmark in 1472 or 1473 sent out an expedition under two adventurers, Diedrick Pining and Hans Pothorst, who were joined by the Norwegian Johannes Scolvus and a Portuguese nobleman, João Vaz Cortereal. This expedition reached Greenland in the vicinity of Angmagssalik, where it was attacked by Eskimo. According to Dr. Louis Bobé, it is likely that Columbus learned of this expedition when he visited Iceland in 1476.

In 1537 and 1539 sailors from Hamburg had been blown out of their course to or from Iceland and driven toward Greenland, but they had been prevented from landing by bad weather. This led to an expedition from Hamburg under Gert Mestermaker which found the country, but did not see any of the inhabitants. At this time there was much talk about Greenland, but nothing was done.

The Englishman, Martin Frobisher, in 1576 sighted the east coast of Greenland in latitude 61° N. and circumnavigated Cape Farewell, but was prevented from landing by the ice, in which one of his ships was lost. He undertook another voyage in 1577, but again was unable to reach the coast because of the ice. On his third voyage in 1578 he landed somewhere on the southwest coast, without appreciating the fact that it was Greenland, and took possession of the territory in the name of Queen Elizabeth of England. He found that the Eskimo were in possession of some metal instruments from which he concluded that they had had intercourse with strangers.

In 1579 a Danish expedition under the command of an Englishman, Jacob Allday, was on the east coast of Greenland, but it did not reach land, and in 1581 the Faroese Magnus Heinesen tried in vain to reach the east coast.

The Englishman John Davis in 1585 (the year of the first attempt to establish a colony in Virginia) discovered Gilbert's Sound on the west coast of Greenland in latitude 64°15' N. (the site of the present settlement of Godthaab) where he met Eskimo, but found no trace of the Icelanders. He made a second voyage in 1586, and a third in 1587 (the year in which Virginia Dare, the first child of English parentage, was born in Virginia). On his last voyage he sailed far up the strait named for him and reached a lofty granite island in latitude 72°41' N. which he named Sanderson's Hope (now called Qaersorsuaq) in honor of a merchant, William Sanderson, one of his backers. Davis called the country "The Land of Desolation." He called the northern part London coast,

and the southern extremity Cape Farewell, because he could not get within 6 or 7 miles of it on account of the ice.

Dr. Bobé writes that the rediscovery of Greenland—Davis had failed to identify his Land of Desolation with the old Greenland—should be dated from an expedition sent out by King Christian IV in 1605 which included in its personnel three English navigators, James Cunningham, who in 1603 had served as a captain in the Danish Navy, John Knight, and James Hall, and in addition the Danish nobleman Godske Lindenow and Peter Kiildsen. Mainly through the work of James Hall, this expedition obtained much geographical information of great value. Hall in 1612 made another very important voyage, this time under the auspices of the "Merchant Adventurers of London." On this expedition he was accompanied by William Baffin.

The chief interest of the Danes and English now temporarily shifted to other parts of the world, and the Dutch took the lead in Arctic exploration, sending out many expeditions and adding greatly to the knowledge of Greenland, and also Spitzbergen which was usually regarded as a part of, or at least belonging to, Greenland.

The expedition with John Cunningham in command had brought back skins of polar bears and blue foxes as well as narwhal tusks which had been procured by trade with the natives. It was, however, the whaling about which the commercial intercourse with Greenland centered. As early as the second half of the sixteenth century the Basques visited this area in specially equipped boats with special implements, among others the harpoon—the name of which is the only Basque word in common use in English. As late as about the middle of the eighteenth century Dutch vessels might meet the Basques in Davis Strait on their way to Baffin Bay. But the Basques kept to the open sea, as they did off Iceland and off Newfoundland, and did not make contact with the natives. The Basques were the great experts in whaling, and from them the English, Danes, and Dutch learned the art.

The growing ascendancy of the Dutch over the English in the Arctic, and their discovery of various coastal regions of Greenland, of which they took possession in behalf of the Noordsche Compagnie, aroused the active interest of King Frederick III in the country, for during the whole period between the discontinuation of the sailings and the recolonization the kings of Denmark considered themselves the legal masters of Greenland. During the reign of King Frederick III three expeditions were sent to Greenland (from 1652 to 1654), and in 1666 the King included the polar bear in the coat-of-arms of Denmark as the special symbol of

Greenland. In 1691 his son, Christian V, issued a decree prohibiting Hanse trade in Greenland.

The Dutch continued to trade extensively with the natives, with whom they appeared to be on more or less hostile terms. By 1720 trade was rendered difficult, apparently both because the natives became more and more afraid of them, and because they were surfeited with Dutch goods.

It was Hans Povelsen Egede, a pastor in Norway, who through his initiative and wonderful perseverance caused the trade with Greenland to be resumed. This was done by means of a joint stock company incorporated in Bergen the object of which was a combination of trade, colonization, and Christianization of the country. He was supported by King Frederick IV, who appointed him as Royal Missionary. The company was organized primarily to support his work as a missionary. In 1721 he landed in Greenland and established the first permanent settlement.

Adversities, troubles with the Dutch, shipwrecks and other accidents, and dissensions between the directors, resulted in the liquidation of the Bergen Company in 1727. The King now took a direct and personal interest in the affairs of Greenland, and in 1729 the administration was transferred from Bergen to Copenhagen. Dissensions among the people sent out, more troubles with the Dutch, and other difficulties wrecked the royal enterprise. But in spite of all mistakes and difficulties, trade was progressing and offered hopes of eventually proving remunerative.

After much discussion and negotiation, Jacob Severin was granted permission to take over the Greenland trade as a monopoly for 6 years. Much difficulty was encountered with the numerous ships from Hamburg, Altona, Bremen, and the Dutch ports which visited Greenland and traded with the natives in defiance of the monopoly. In addition to these, from 120 to 180 vessels from Holland, Bremen, and Hamburg carried on offshore whaling with much profit to themselves, besides many large Basque men-of-war and a few French ships; the Spanish (Basque) and French, however, kept to the western ice and did not molest the settlements of the Greenlanders.

As a result of continued difficulties with the Dutch, Greenland was granted the right to defend herself, and Severin armed his three vessels. About the middle of May 1739 a naval engagement was fought between Severin's three ships and five Dutch ships, in which the latter were captured. In spite of all his numerous difficulties, Severin persisted in his work. New posts were established, troubles with foreigners were somewhat lessened, and relations with the natives greatly improved.

In 1746, a few days after the accession of King Frederick V, liberal patron of the arts and sciences, a peace treaty was concluded with Algeria



by virtue of which this pirate state guaranteed Danish vessels against seizure. This agreement gave rise to the establishment of the General Trading Company in 1747, with a concession for 40 years. In its Greenland ventures this company encountered all kinds of difficulties. The Dutch were again troublesome. About 1764 a settlement with the Dutch was brought about by the English and French ministers at Copenhagen acting as arbiters. It was resolved that Denmark should annul the restrictions on the fisheries, while the Dutch should cease trading with the natives.

The war between England and the North American colonies, in which France, Spain, and Holland were more or less involved, paralyzed the shipping industry of those countries, which was taken up by neutrals and by them carried on with immense profit, particularly by Denmark-Norway.

Since January 1, 1776, the Greenland trade has been a royal monopoly, which included the administration of the island. The instructions regulating the Greenland trade which were issued on April 19, 1782, and for nearly a century were the foundation of the administration of the country, pointed out many errors and defects in the old system and introduced order where hitherto there had been utter confusion. The traders were earnestly instructed to associate with the Greenlanders in a sensible and careful manner, to distribute among them the best sealing grounds, to encourage them to diligence and economy, and to undertake the trade which, according to season, must be considered the most profitable, to instruct them in fishing and the proper manner of intercourse, to exhort them to enter into partnership or reasonable contracts with the Danish whalers where and when it was required by circumstances—in short, to give due consideration to their interests in all matters.

In spite of good intentions, this new arrangement did not do much to improve conditions. The chief difficulty now was with the English, especially in the northern districts. As late as 1787 there were more than 60 English as well as 7 Dutch vessels in the bay as Godhavn, where their presence was greatly to the detriment of the natives. The directors of the company dared not offend the English by trying to drive them away.

During the war between Denmark and England, from 1807 to 1814, the Greenland trade received a blow from which it did not recover for many years, and great suffering resulted, especially among the resident Danes. However, the English privateers that infested the coast were very considerate, for England had declared Greenland neutral territory, and the English even sent ships to Greenland with provisions for the people.

After the war things went from bad to worse. Illicit trading flourished, in connivance with the crews of the ships sent out, and even in connivance with the employees of the company in Copenhagen. An energetic attempt to abolish this corruption was made by P. A. Eskilden, an able and energetic man who was appointed director of the company in 1822. He died in 1825 and was succeeded by J. H. Gedde, who uncompromisingly did away with old blundering methods and customs, and introduced efficient administration. From this time conditions began to improve, though slowly and irregularly.

By a Royal Order of April 1835, the Greenland Commission was appointed to report on the possibilities and conditions of a more or less extended free trade in Greenland. After 5 years of deliberation the majority of the Commission strongly advised against breaking away from the trade system hitherto followed, although all agreed that the monopoly should be abolished as soon as the cultural stage of the inhabitants, and local conditions, permitted. The work of this Commission resulted in various reforms for the economic and spiritual benefit of the Greenlanders.

A new Commission was appointed on March 2, 1851, with the object of considering Greenland's affairs. This Commission was composed of experts and men acquainted with local matters, among them the Inspectors for the Northern and Southern Districts, Carl Peter Holbøll, a former naval officer, and Dr. Hinrik Johannes Rink, a former missionary. With a few exceptions the reforms proposed by this Commission were not carried out. However, interest in Greenland had been aroused both among the Danish people and in parliament.

Dr. Rink spent 16 winters and 21 summers in Greenland, from 1853 as manager of the Julianehaab settlement, and from 1858 as Royal Inspector, and in 1870 was appointed director of the Royal Greenland Trading Company. In 1856-1857 he put forth a proposal for the introduction of native boards of guardians. These boards were to consist of the most competent individuals, each representing a small district. Their object was to form a sort of intermediary between the native and the Danish officials and employees. An experiment was made in South Greenland, and this led to the establishment of boards of guardians in both provinces in 1862-1863. This institution is the cornerstone of the development of the modern social and administrative organization of Greenland.

In all fields Dr. Rink tried to do away with old abuses, and to improve the condition of the natives. After Hans Egede there is no one to whom

the Greenlanders owe a greater debt of gratitude than to the friendly, able, and persistent Dr. Rink.

Throughout his career Dr. Rink met with great opposition and every sort of discouragement in his efforts to improve the condition of the Greenlanders. His cause was much helped by a young naval officer, E. Bluhme, who in 1864 published a book which he bluntly stated was intended as a controversial work in favor of the growth and development of the Greenland community. He frankly criticised the employees of the administration, the Danish mission, and the Moravian Brethren, who had been the cause of constant trouble, and made various suggestions, most of which were realized before his death in 1926.

In 1888 an auxiliary steamer replaced the old sailing ships in the Greenland trade. The first steamer built for the purpose was wrecked in 1895. A Norwegian whaler was purchased, which was wrecked in 1896, and a steamer which had been chartered to replace it burned on the way out. However, since 1898 steamers have been successfully employed.

Various scientific expeditions had aroused so much interest in Greenland that in 1893 the Danish Tourist Company applied for permission to equip tourist expeditions to Greenland, but permission was, on quite adequate grounds, refused.

In 1894 the hitherto neglected east coast was opened up by the establishment of a new station at the Eskimo settlement at Angmagssalik in latitude 65°36' N.

In the years 1902-1904 the so-called Literary Greenland Expedition visited Greenland under the command of the author and journalist Ludvig Mylius-Erichsen, accompanied by Knud Rasmussen. The object of this expedition was to study the life of the Eskimo in Christianized west Greenland as well as in the Cape York District where the inhabitants were still heathen, and by comparing conditions to arrive at an understanding as to the manner in which civilization and culture had acted on the native population. The underlying idea was that what had been done by Denmark, through missions and trade, had been rather to the detriment of the natives. Even though this point of view was greatly modified in the course of the expedition by its investigations, still one of the main results was a severe criticism of the old system and a vehemently expressed demand for reforms. This demand later led to tangible results.

In 1906 coal was first mined in Greenland, and coal mining is now an important, though purely local industry. Another direct result of this expedition was the mission established in 1909 under the leadership of natives at Ũmánaq in the Cape York District, and the Thule station



founded by Knud Rasmussen in the same place in 1910 with the object of trading with the natives, and of forming a base for the scientific exploration of the polar regions.

In 1908 trade and administration were temporarily separated, and a distinction was made between "the administration and settlements in Greenland" and the Royal Greenland trade; but they were again united in 1912. The present administration is based upon the Act of April 18, 1925.

#### MODERN GREENLAND

Greenland is now a Danish Crown colony, administered by one of the Government Departments in Copenhagen. The officials of the Greenland Administration are principally concerned with the trade, though they also have administrative and judicial powers.

Apart from the fisheries, some sheep farming, and some mining, Greenland lacks everything which might make its colonization by Europeans profitable. The only way, therefore, by which Denmark has been able to utilize its resources was by trading with the native population.

When Hans Egede went to Greenland in 1721 he founded a private trading company in Bergen the purpose of which was to provide the necessary funds for the maintenance of the missionary work which was started at the same time. This company established a number of trading posts on the west coast, while the traders during their journeys along the coast carried on extensive bartering with the natives. But the enterprise was not successful, and after a few years it was abandoned. The trade was then taken over by the Government and, except for short periods during which concessions were granted to private companies, has continued as a state monopoly.

For a long time the Danish Administration of Greenland has regarded as its chief object the protection of the economic existence of the natives. The reason why the trade monopoly is still maintained, and why Greenland—with the exception of the uninhabited parts of the east coast—has been closed to non-Greenlandic fishermen and hunters, Danes as well as foreigners, is consideration for the natives. Greenland is one of the few colonial areas where consideration of what is best for the native population outweighs the demands of European trade. Greenland is one of the trade settlements where the colonial power exercises a considerable influence on the economic life of the natives, while at the same time the natives to a very large extent have been permitted to retain their economic independence.

The Administration has endeavored to develop and stimulate the economic life of the natives in certain directions. Fishing especially is being encouraged. But here also it is the well-being of the natives that is the chief consideration. The object is to teach the natives themselves to exploit the resources of the country. Greenland, in the opinion of the Administration, should contribute as much as possible to the economic life of the world, but in such a manner as to benefit the local population.

In normal times the Administration of Greenland, including the trade operations, is centered in Copenhagen. The Greenland Administration (Grønlands Styrelse) is presided over by a director who is directly responsible to the Prime Minister. A special section of the Administration takes care of the trade—purchase and assembling of goods for Greenland, and sale of the exports from the colony.

The exports from Greenland consist of blubber, liver, bear skins, blue and white fox skins, seal skins, walrus hides, white whale hides, shark skins, eider rugs, eider down, bird feathers, baleen, narwhal and walrus tusks, and fish of various kinds; also cryolite, graphite, and some copper, asbestos, and mica. There are large deposits of coal over the whole of the basalt area of west Greenland, particularly on Disko and Nûgssuaq, but the product of the mines is consumed locally.

By far the most important exported product of Greenland is the cryolite, used in the manufacture of aluminum. The mining activities at Ivigtût are carried on by a private licensed company. The profits of the trading monopoly, if any, are entirely insufficient to cover the expenses of the Greenland Administration—salaries of officials, maintenance of schools, churches, hospitals, communications, etc.—but the deficit has in recent years been covered by royalties from the Cryolite Company. The output of the cryolite mine is at present exclusively at the disposal of the United States and Canada, and the Danish mines in Greenland thus play a very important part in the war effort.

With regard to imports, the Greenland Administration has always made a distinction between articles which are considered necessary and those that may be considered luxuries, such as coffee, sugar, and tobacco. The former are sold at a very small profit, or even at a loss, while the luxuries are sold at a considerable profit. But the natives of South Greenland, according to rough calculation, spend from 76 to 80 percent of their income on coffee, sugar, and tobacco.

For purposes of local administration Greenland is divided into three provinces: South Greenland, from Cape Farewell to North Ström Fjord; North Greenland, from North Ström Fjord to Northeast Foreland; and East Greenland, from Northeast Foreland to Cape Farewell.

The highest official in South and North Greenland is the Landsfoged or Chief Administrator, whose duties, in addition to being administrative and judicial, include the supervision of public health and trade. The Chief Administrators of South and North Greenland reside in Godthaab and Godhavn respectively.

South and North Greenland are divided into 13 Districts, each of which is subdivided into outposts.<sup>5</sup> These, with their population in 1927 were as follows:

	Europeans	Greenlanders
<b>SOUTH GREENLAND</b> .....	92	8,014
Julianehaab District, with 8 outposts.....	26	3,518
Frederikshaab District, with 3 outposts.....	5	981
Godthaab District, with 4 outposts.....	37	1,276
Sukkertoppen District, with 3 outposts.....	17	1,363
Holsteinborg District, with 3 outposts.....	7	876
<b>NORTH GREENLAND</b> .....	99	6,819
Egedesminde District, with 6 outposts.....	14	1,646
Christianshaab District, with 3 outposts.....	2	599
Jacobshavn District, with 2 outposts.....	19	653
Ritenbenk District, with 3 outposts.....	8	679
Godhavn District, with 3 outposts.....	21	400
Ūmánaq District, with 8 outposts.....	19	1,406
Upernivik District, with 8 outposts.....	16	1,152
Thule District, with no outposts.....	0	284

In each District there is a main trading post (settlement), after which the District is named. The head of a District is the Kolonibestyrer or District Manager who cares for the trade and exercises local police authority.

In addition to those mentioned above, there are two trading posts in East Greenland, one at Angmagssalik with 9 Europeans and 696 Greenlanders, and another at Scoresby Sound with 4 Europeans and 105 Greenlanders. East Greenland is supervised by an Inspector ordinarily residing in Copenhagen. In normal times he visits the settlements of the east coast every summer. When the Inspector is in Copenhagen, all administrative functions rest with the Manager and the clergyman.

Not included in the preceding enumeration are about 125 Europeans employed in the cryolite mine at Ivigtût.

At present there are about 500 Danes and 18,000 natives in Greenland.

The whole population of Greenland belongs to the Lutheran faith. There are a great number of churches scattered all over Greenland, and

---

<sup>5</sup> There have been minor changes in the Districts and outposts since 1927, but the details are not available.



the Church plays a very important role in the daily life of the population. The Dean of Greenland resides in Godthaab. The clergymen in the settlements are usually Danes, though in some cases Greenlanders. In the outposts the pastors, who are at the same time teachers, are generally Greenlanders.

There are high schools in two of the settlements, and a seminary for the education of teachers in Godthaab. In normal times the Greenlanders who show the necessary qualifications are sent to Denmark for further education.

A staff of Danish doctors and nurses are resident in Greenland, and there are about 15 small, though rather well-equipped, hospitals. The health conditions have improved very much in the twentieth century, and there has been a steady increase in the Greenland population during the last 40 years.

One of the interesting features in the administration of Greenland is the participation of the native Greenlanders in governmental affairs. This has been developed from the "boards of guardians" established as a result of a proposal made to the Ministry of the Interior in 1856, principally on the initiative of Dr. Rink and Samuel Kleinschmidt.

First come the Municipal Councils, of which there are 26 in South Greenland and 36 in North Greenland. Every dwelling place with two or more householders entitled to vote can elect a member to the local Municipal Council, the Councils to consist of at least three members elected for a term of 4 years. The duties of the Municipal Councils consist partly in the administration of grants for the support and relief of the poor, decided at meetings held monthly during the 6 winter months, and partly in repartition proposals. They also deal with cases of inheritance, civil cases, and misdemeanors.

Each district has a District Council or "Sysselraad." The object of the District Councils is to bring about a greater uniformity in municipal and intermunicipal administration, and to counteract the tendency to devote attention purely to local interests. The District Councils consist of those members of the Provincial Councils who may live in the District, the chairmen of all the Municipal Councils in the District, and all the Danish officials holding appointments in the District. Among other duties of the District Councils are the inspection of schools and oversight of all matters relating to public health.

South and North Greenland each have a Provincial Council which meets every other year under the presidency of the Landsfoged. The members of these Councils are elected from the members of the Municipal Councils in each District, 11 in South Greenland and 12 in North Green-

land, and hold office for a term of 6 years. They are concerned with matters affecting the entire province.

The two settlements in East Greenland are not as yet sufficiently advanced to justify the establishment of Councils.

When the Virgin Islands were purchased from Denmark in 1916 the United States formally relinquished all claim to territory in northern Greenland that had been discovered by Rear Admiral Robert Edwin Peary. On May 10, 1921, the Danish Government placed the Greenland Administration in charge of the entire colony, extending the trade monopoly to the whole of Greenland. The east coast, however, was opened to Danish scientific men and trappers in 1924, and by special agreements Norwegians and citizens of certain other countries have been granted similar rights on the east coast. A dispute between Denmark and Norway concerning the sovereignty over part of the east coast was settled in favor of Denmark by the Permanent Court of International Justice in The Hague in 1933.

When Denmark was invaded and occupied by German troops on April 9, 1940, the Danish Government came under German control and was no longer able to continue the administration of Greenland. A temporary Central Office for the local administrators was therefore established at Godthaab, in South Greenland, by the two Chief Administrators. Since October 1941 a special section of the Danish Consulate General in New York, established by the Minister of Denmark in Washington, the Hon. Henrik Kauffmann, is in charge of the supply of necessities to Greenland, and the sale of Greenland products.

On April 9, 1941, Mr. Kauffmann, acting independently of the Government in Copenhagen, which for the time being is prevented from exercising its powers in respect to Greenland, concluded on behalf of Denmark an agreement with the American Government according to which the United States acquired the right to establish military bases on the island for the duration of the war. In return, the American Government agreed to protect Greenland against aggression and reiterated its recognition of and respect for the sovereignty of the Kingdom of Denmark over the whole of Greenland.

#### LANGUAGE

The language of the Greenland natives is a dialect of the common language spoken by all the Eskimo from eastern Greenland to eastern Siberia. In Greenland itself there are slight variations from one region

to another. Dr. C. W. Schultz-Lorentzen gives the following account of the Greenland language:

He first calls attention to the mental peculiarity of the Eskimo—the appositive as opposed to the compositive manner of thinking, which means that they possess their ideas as juxtaposed elements without being able to sum them up. This peculiarity is a very marked feature of the language, which is essentially a juxtaposition of words, each independent and expressing a finished context. What we understand by sentences is a concatenation of ideas joined together by verbs, the object of which is above all to combine and keep together the fixed elements and thus to give the impression of something gliding and flowing. But the Eskimo content themselves with the noun, which in compensation contains all the elements required for supplying an aggregate complete meaning. Thus the character of the Eskimo language is very different from that of our own group of languages. For example, there are, strictly speaking, no classes of words or declensions, and attention must be exclusively directed toward the words and the manner in which they are built up. An Eskimo word is constructed from the following elements:

Base or stem, affixes, and endings or final affixes. The base or stem is generally rather short, consisting of one or two syllables, and denotes that which to the Eskimo is the main idea of the word. The stem may frequently be a word which can be used without any addition, for instance, *kiak*=heat; *isse*=cold; *inuk*=human being. Sometimes, however, the stem does not make sense as an independent word, and therefore cannot be used without an affix, but its meaning as a word is presupposed, and in many cases it has passed out of use in Greenland; an example is *tatigâ*=he relies upon him, where the stem is *tatik* or *tate*, a word which is used among other Eskimo in the sense of a pillar, but has disappeared from the spoken language. The stem, however, very frequently cannot be used independently in its composite form, for instance, *ani*=turning outward, or *pu*=swelling upward. There are a few stems which are so neutral as only to attain a meaning by means of the affixes. It is also justifiable to speak of stems in a second degree—extensions and modifications of primary stems proper with a derived meaning. Thus from *pu*=swelling, secondary stems occur, as for instance *pue*=abscess, and *puak*=lung.

The stems are regularly extended by means of affixes which add something to the meaning of the word by indicating its dimension, circumstances, treatment, etc. There are affixes which can be tacked on to any stem, others which favor certain word groups, or even individual words.



But within certain rather wide limits, it is possible to tack on one affix after another to a stem.

Stems, independent or extended by affixes, are finally completed by final affixes, the latter indicating whether the stem is singular, dual, or plural, as well as its relation to another link in the composite word group, or to the whole meaning. Among these endings are some which correspond to our prepositions and are used to indicate place, direction, road, distance, mode, or comparison. The person is expressed by other endings which in sense more or less correspond to our possessive pronouns. While what is usually termed the third person has a special character, the first and second persons occur with definite endings, and in addition a reflexive person, referring to the subject.

Dr. Schultz-Lorentzen gives the following example of how an Eskimo word is constructed by means of the elements mentioned:

*eqaluk* means a salmon, being a secondary stem of *eqa*, which is not used.

*eqalug-ssuaq*, with the affix *-ssuaq*, meaning large; but among the Eskimo meaning "the large salmon," that is, the shark.

*eqalugssuar-niar-*, shark fishing.

*eqalugssuarniar-iartor-*, going out to fish for shark.

*eqalugssuarniariartor-qu-*, bidding to go out to fish for shark.

*eqalugssuarniariartorqu-ssaq*, bidden to go out to fish for shark.

*eqalugssuarniariartorqussa-u-*, has been bidden to go out to fish for shark.

*eqalugssuarniariartorqussau-galuar-*, has, properly speaking, been bidden to go out to fish for shark.

*eqalugssuarniariartorqussaugalua-qau-* has, properly speaking, been forcibly bidden to go out to fish for shark.

*eqalugssuarniariartorqussaugaluaqau-gut*, we have, properly speaking, been forcibly bidden to go out fishing for shark.

Whereas the earlier additions to the word have been affixed, the last is an ending indicating the first person plural.

The word given as an example must be translated as a verb in the indicative mood, though judging from its form it is decidedly a noun. As a matter of fact, it holds good for all Eskimo words that they are mainly of the nature of nouns, with the closely defined complete meaning of the noun. A connected group of words thus becomes a series of juxtaposed complete forms. *tusarpunga*, I hear, according to its form is to be regarded as a noun, "my hearing." *tusarpara*, I hear it, strictly means the complete "that heard by me." Still there is in the language a tendency to get beyond the noun and to express a meaning which indicates the flowing, gliding, and uniting character of the verb. We find an affix *po*, *pa*, and *pe* which clearly indicates the verbal character of

the word, and it is possible to make use of two personal endings, one of which indicates the subject and the other the object. Dr. Schultz-Lorentzen remarks that it might perhaps be said that the language had already become set before the verbal elements were completed.

The language of the first European settlers of Greenland was Icelandic and did not differ from that of the parent country, Iceland. After the resettlement the language of the Europeans was Norwegian-Danish, that of the natives, Eskimo. At the present time the Europeans speak Danish, while the Greenlanders are encouraged to use their own language.

#### LITERATURE

The early literature dealing with Greenland consists of some Eddic poems characterized by a weird and gloomy note that bears witness to the wild nature of the surroundings amidst which it was composed, and was possibly written in Greenland, and two sagas, the *Eiríks saga Rauða*, or *Þorfinns saga Karlsefnis*, and the *Grœnlendinga Saga*, both undoubtedly written in Iceland. They are properly a part of early Icelandic literature.

The modern literature of Greenland, according to Dr. C. W. Schultz-Lorentzen, is intimately connected with the development of the Eskimo language under the civilizing influence of the Danish colonization.

In its original form the language of the Eskimo naturally had the exact scope determined by their material and intellectual requirements. It has been characterized as a Stone Age language, and indeed there is a certain uncouth roughness about it. It is a language dealing with real facts and things and experiences as seen and conceived.

When the Eskimo came into contact with the culture of the Europeans they received such an overwhelming flood of new impressions and experiences that their language was naturally modified. The translators and adaptors of the native language were principally Europeans, and however sincere their endeavor not to violate the native language in its primitive form, the task they had set themselves was beyond their powers.

The first book published in Eskimo was a small primer with short texts probably compiled by Hans Egede and printed in Copenhagen in 1739. The next book to be printed was a kind of instruction in Christian knowledge, the chief portions of which were taken up with the *ordo salutis* and Luther's catechism. These first textbooks were followed by a number of similar works compiled by successive missionaries (Poul Egede, 1756; Thorhallesen, 1777; Otto Fabricius, 1818; and others) with contents which were altered according to the demands of the times, and with an increasingly surer touch from the linguistic point of view.

According to Dr. Schultz-Lorentzen these books in a way were preliminary to the translation of the Bible. Poul Egede began to send out the gospels in 1744. He was only a boy when he arrived in Greenland with his father Hans, and learned the language through playing with his native friends. In 1766 his translation of the New Testament appeared.

Otto Fabricius, who succeeded Poul Egede in his capacity as a teacher of the Eskimo, was not so intimately acquainted with the language, but he was a more profound scholar and had received more systematic training. He retranslated the New Testament in 1799 and began a translation of the Old Testament, but only got as far as Exodus when he died in 1822. The work of Fabricius was continued by Niels Giessing Wolf, and after him by Peter Christian Kragh, who in the years from 1822 to 1836 translated and supervised the printing of one part of the Old Testament after another.

About the middle of the nineteenth century when the work of the Danish Mission had come more or less to a standstill, at least from the point of view of literature, the Moravian Brethren took the lead. In 1851 and 1862 they brought out a revised translation of the Old Testament. It was one of their number, Samuel Kleinschmidt, who in various ways broke new ground in the field of Eskimo literature. In 1851 Kleinschmidt, the son of a Moravian missionary born in Greenland and educated in Europe, had published a grammar in which he attempted to explain the Eskimo language on the basis of its own laws. In 1871 he published a dictionary which is arranged methodically in accordance with the recognized stems. He had his own small printing press from which his numerous translations and other works emanated. His chief work was the new translation of the Bible published in parts at various times.

It was not until 1900 that the first complete translation of the Bible was published. This translation, with a slight revision of the New Testament in 1912 by Christian Vilhelm Rasmussen and C. W. Schultz-Lorentzen, is that in use today.

The history of the translation of the Bible is important, because the language used in it has exercised, and will continue to exercise, a great influence on the popular language of Greenland. Through the translation of the Bible a kind of standard language has come into existence, which is continually gaining ground at the expense of the popular language.

As through the schools the native population became proficient in reading, a craving for books arose that could not be satisfied by the Bible and textbooks. At an early period manuscript translations of Danish and foreign literature were circulated. But soon national subjects were introduced, such as the "Evening Talks" of Hans Egede, which



were printed in 1857. In the years 1859-1863 four volumes of "Greenlandic Legends" appeared, with translations in Danish.

The period after the middle of the nineteenth century became, generally speaking, a notable epoch in the cultural development of the Eskimo, centering around the names of Samuel Kleinschmidt and Dr. H. J. Rink. In 1861 a monthly magazine, *atuagagdliutit* (=reading), was established, edited by native editors, which still continues. The first editor was Rasmus Berthelsen, who was succeeded by the printer Lars Moller, who died not very long ago. In this magazine, the contents of which are very diversified, there are a good many novels and stories, among them "Robinson Crusoe" and Kipling's "Captain's Courageous." It also contains articles on current events, on discoveries, and on scientific progress. More recently a special periodical, *avangnâmioq* (=North Greenlander), has been established. In addition to these there are a few small religious papers.

Originally the Eskimo were in the habit of expressing all emotions beyond the experience of everyday life to the accompaniment of drums. But from the very beginning this came under the ban of the missionaries because it was bound up with heathen worship. Instead of this, hymns in the European style were introduced. In the course of time many hymns were translated, and the Eskimo now have their own hymn book, which has passed through many editions. In the latest edition (1907) the names of a number of native psalmists are found.

There has also developed a native secular poetry. In 1907 a Greenlandic book of songs appeared, a number of which were composed and set to music by natives; in later editions this book has been enlarged. It is now found in almost every household in Greenland.

In recent years energetic efforts have been made toward creating an actual literature in the Greenlandic language under the auspices of a Greenland literary society, of which the chief moving spirit was the famous Arctic explorer the late Knud Rasmussen who, born in Greenland and with one-sixteenth native blood, was intimately familiar with the language and spirit of the Greenlanders.

#### AMERICAN INTEREST IN GREENLAND

It was in 1732 that American whaling ships first visited Davis Strait in search of the bowhead or Greenland whale. By 1737 a dozen vessels were fitted out at Provincetown alone for the Davis Strait whale fishery. But after 1741 the whalers were so molested by French and Spanish privateers that this fishery was abandoned for some years. It was finally

given up as a losing venture because of the scarcity of whales and the low price of whale products after 1897.

Except for this, American interest in Greenland has been centered in exploration, especially in the northwestern and northern portions; in the use of Greenland as a base for the discovery of the North Pole; and more recently in detailed scientific investigations—geographical, meteorological, and biological—in cooperation with the Danes.

The loss of Sir John Franklin's expedition in search of a northwest passage was widely noticed in the press of that time, and several expeditions were sent out from England to search for Franklin and his companions, or at least to learn something of their fate. Interest in Franklin was not confined to England. In 1850 Henry Grinnell, a wealthy merchant of New York, fitted out two ships, the *Advance* and the *Rescue*, which he turned over to the United States Government for use on an expedition the chief objective of which was to search for Franklin and his men, with a secondary objective of obtaining scientific information. This expedition was placed under the command of Lt. Edwin Jesse de Haven, United States Navy, who had been with Wilkes in the Antarctic, with Dr. Elisha Kent Kane as chief surgeon.

Later, in 1853-1855, Mr. Grinnell placed the *Advance* at the disposal of Dr. Kane, together with a considerable sum of money. Dr. Kane explored northwest Greenland and Grinnell Land, and reached the highest latitude ever reached by a sailing ship. Further search for traces of the Franklin expedition was made by Charles Francis Hall in 1860-1862, Mr. Grinnell again contributing toward the expenses.

In 1860-1861 Dr. Isaac Israel Hayes wintered at Port Foulke and traversed the inland ice for 40 miles. In 1871-1873 Hall in the *Polaris* reached latitude 82°11' N., a new record for this sector, but succumbed to the hardships.

In connection with the First Polar Year, Lt. (later Maj. Gen.) Adolphus Washington Greeley commanded an Arctic expedition in 1881-1884. Lt. James Booth Lockwood, a member of this expedition, carried out some remarkable sledge journeys, reaching latitude 83°24' N. in longitude 42°45' W., the farthest north of that time, and filling in many geographical details.

Rear Admiral Robert Edwin Peary made his first polar expedition in 1886, traveling for 117 miles over the inland ice. In 1890-1894 he crossed the inland ice from north of Inglefield Gulf to Independence Fjord, and returned. In 1898-1902 he made his first attempt to reach the North Pole; though unsuccessful in this, he proved that Greenland is an island,

and charted the northern coast. In 1902 he traveled to Cape Hecla in Grant Land and thence northward over the ice to latitude  $84^{\circ}17'$  N. in longitude  $70^{\circ}$  W., when he was compelled to return. In 1905, with Capt. Robert Abram Bartlett, he voyaged by Smith Sound and the north coast of Grant Land, sledged to Cape Hecla, and made a new record by reaching latitude  $87^{\circ}06'$  N. In 1908-1909 he reported having reached the Pole, where he made a sounding through the sea ice to a depth of 9,000 feet without reaching the bottom.

In 1913-1917 Donald Baxter Macmillan commanded an expedition in search of Croker Land, sighted by Peary; further exploration was carried on in Ellesmere Land and the northwest.

Prof. William Herbert Hobbs and his associates in 1930-1931 carried on extensive meteorological and other scientific work in Greenland.

Greenland, including the surrounding seas, has been explored with great thoroughness by the Danes. Much supplementary work has also been done by investigators from other countries. Among those in this country may be mentioned Miss Louise Arner Boyd, well known for her explorations in East Greenland, and Columbus O'Donnell Iselin, who carried out oceanographic studies in Davis Strait.

Ever since he first went north with Admiral Peary, Capt. Robert A. Bartlett has had a deep and lasting interest in Greenland. Spending many summers in Greenland waters, on both the west and east coasts, he and his associates have brought back extensive physical and geographical data and collections of all kinds which have contributed in no small degree to our knowledge of this area.

#### SELECTED BIBLIOGRAPHY

The literature on Greenland, chiefly in Danish, English, and German, is extensive, but by far the greater part has been published in Copenhagen, largely under the auspices of the Kommissionen for ledelsen af de geologiske og geografiske undersøgelser i Grønland (Commission for the direction of the geological and geographical investigations in Greenland). This Commission has published two encyclopedic works on Greenland, one in English entitled "Greenland," in three large volumes, 1928-1929, the other in Danish entitled "Grønland," in two volumes, 1921, on the two-hundredth anniversary of the first settlement by Hans Egede. Since 1879 the Commission has published a series of articles on Greenland, many of which are in English, under the title of "Meddelelser om Grønland"; this series now includes more than 140 volumes.



The information given in the preceding pages is wholly from Danish sources, mainly from the publications of the Commission. The completed manuscript was most kindly examined and criticized by the Hon. C. A. C. Brun, Counselor of the Royal Danish Legation, Washington.

## INDIVIDUAL BOOKS

BERLIN, KNUD KUGELBERG.

1932. Denmark's right to Greenland; a survey of the past and present status of Greenland, Iceland, and the Faroe Islands in relation to Norway and Denmark. Oxford.

BOAS, FRANZ.

1909. The relationships of the Eskimos of East Greenland. Science, vol. 30. New York.

BOYD, LOUISE ARNER.

1935. Fiord region of East Greenland; with contributions by others. New York.

CHAPMAN, FREDERICK SPENCER.

1936. Watkins' last expedition. London.

CLAVERING, D. C.

1830. Journal of a voyage to Spitzbergen and the east coast of Greenland. Edinburgh.

DAMAS, D.

1910. The oceanography of the Sea of Greenland. Ann. Rep. Smithsonian Inst., 1909.

GEORGI, JOHANNES.

1935. Mid-ice; the story of the Wegner expedition to Greenland. New York.

GRAAH, [Capt.] W. A.

1837. Narrative of an expedition to the east coast of Greenland. London.

GREELEY, [Maj. Gen.] A. W.

1910. Handbook of polar discoveries. Boston.

HAYES, I. I.

1867. The open Polar Sea. London.

HOBBS, W. H.

1926. The glacial anticyclones. New York.  
1930. Exploring about the North Pole of the winds. New York.

JAKHELLN, ANTON.

1936. Oceanographic investigations in east Greenland waters in the summers of 1930-'32. Oslo.

JENSEN, AD. S., and HARDER, POUL.

1910. Post glacial changes of climate in Arctic regions as revealed by investigations on marine deposits. Stockholm.

JOERG, W. L. G. (editor).

1928. Problems of polar research. New York.

KANE, E. K.

1856. Arctic explorations; the second Grinnell expedition in search of Sir John Franklin, 1853-'55. 2 vols. Philadelphia.

KENT, ROCKWELL.

1930. North by east. New York.

1932. Greenland. New York.

KRABBE, THOMAS NEERGAARD.

1930. Greenland; its nature, inhabitants and history. Oxford.

LINDSAY, MARTIN.

1932. Those Greenland days. Edinburgh.

1935. Sledge; the British trans-Greenland expedition, 1934. London.

MARKHAM, Sir CLEMENTS R.

1881. The voyages of William Baffin. London.

MATHIASSEN, THERKEL.

1937. The Eskimo archeology of Greenland. Ann. Rep. Smithsonian Inst., 1936.

NANSEN, FRIDTJOF.

1911. In northern mists. 2 vols. New York.

1934. First crossing of Greenland. New York.

NARES, Sir GEORGE S.

1878. Voyage to the Polar Sea in H.M.S. *Discovery* and *Alert*. 2 vols. London.

NORDENSKJÖLD, OTTO, and MECKING, LUDWIG.

1928. The geography of the polar regions. New York.

NØRLUND, POUL.

1936. Viking settlers in Greenland and their descendants during five hundred years . . . New York.

PEARY, [Rear Admiral] ROBERT EDWIN.

1898. Northward over the great ice. 2 vols. New York.

PUTNAM, DAVID BINNEY.

1926. David goes to Greenland. New York.

RASMUSSEN, KNUD.

1908. People of the polar north. Philadelphia.

1921. Greenland by the Polar Sea. London.

RUNDALL, THOMAS.

1849. Narratives of voyages towards the north-west, in search of a passage to Cathay and India, 1496 to 1631. London.

SORGE, ERNST.

1936. With 'plane, boat and camera in Greenland . . . New York.

VAN PATTEN, N.

1939. Printing in Greenland. Stanford University Press.

VICTOR, P. E.

1939. My Eskimo life. New York.

WHITE, ADAM.

1855. A collection of documents on Spitzbergen and Greenland. London.

WISSLER, CLARK.

1918. Archaeology of the Polar Eskimo. New York.

## JOURNALS AND REPORTS

atuagagdliutit. Godthaab.

avangnâmioq. North Greenland.

The Danish *Ingolf*-Expedition. Copenhagen.

Geographical Journal (Royal Geographical Society) (see index volumes). London.

Geographical Review. New York.

Grönlands-Expedition der Gesellschaft für Erdkunde zu Berlin. Berlin.

Hakluyt Society. London.

Meddelelser on Grønland. Copenhagen.

National Geographic Magazine (National Geographic Society) (see index volumes). Washington.

Norwegian North-Atlantic Expedition 1876-'78. Christiania (Oslo).

Scottish Geographical Magazine. Edinburgh.

tark'igssut. Godthaab.

University of Michigan; Reports of the Greenland Expeditions. Ann Arbor.







30 000 14603204



3 0 0 0 1 4 6 0 3 2 0 4